STEREOTYPES AND MEMORY

THE EFFECTS OF A POSTERIORI STEREOTYPES ON RECALL OF SOCIAL INFORMATION

AP DIJKSTERHUIS

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CIP-DATA KONINKLIJKE BIBLIOTHEEK, DEN HAAG

Dijksterhuis, Ap

Stereotypes and memory: the effects of a posteriori stereotypes on recall of social information/
Ap Dijksterhuis
Thesis Katholieke Universiteit Nijmegen - With ref. - With summary in Dutch.
ISBN 90-9009838-0
Subject headings: stereotypes / memory.


Print: Offsetdrukkerij Ridderprint B.V., Ridderkerk

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EEN WETENSCHAPPELIJKE PROEVE OP HET GEBIED VAN DE SOCIALE WETENSCHAPPEN

PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Katholieke Universiteit Nijmegen,
volgens besluit van het College van Decanen
in het openbaar te verdedigen op
dinsdag 29 oktober 1996, des namiddags om 3.30 uur precies
door

Albert Jan Dijksterhuis

geboren op 12 november 1968 te Zutphen

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Acknowledgements

For their various contributions, I would like to thank Henk Aarts, Mahzarin Banaji, Galen Bodenhausen, Denise Driscoll, Klaus Fiedler, Arie Kruglanski, Lex Lemmers, Neil Macrae, Joop van der Pligt, Edwin Poppe, Herbert Schriefers, Gün Semin, Russell Spears, Jim Uleman, Bas Verplanken, Roos Vonk, the KLI intergroup perception group and several anonymous reviewers.

Above all, I would like to thank Ad van Knippenberg, Esther Meenhuys, and my mother, Wesselien van de Brink, for their support and indulgence.

Ap Dijksterhuis, August 1996

Contents

Chapter 1

A posteriori stereotype activation and memory

This thesis deals with the influence of activated stereotypes on the retrieval of information from memory. The question I address is: How does a later activated stereotype affect the retrieval of earlier encoded information about a person or about members of a social group?

Imagine you're sitting in a quiet 'no smoking' train compartment and you're reading an exciting book that captures your full attention. After a stop, a group of six or seven boys enter the compartment. They carry a few six-packs of beer along and you spot that one of the boys holds a copy of Shakespeare's "Hamlet" in his hand. The red-haired boy that took the seat opposite yours friendly smiles and offers you a cigarette. Very soon, the boys get more and more excited; they start yelling and screaming and a little later they are ruining the interior of the compartment. You are a bit intimidated and you want to keep on reading so you decide to go to another compartment. You sit down and return to reading.

During the short period of time that you shared the compartment with this group of boys, you may have stored several details in memory, e.g., the copy of Hamlet, the six-packs, the waste-paper basket that was torn off the wall.

The next day, your newspaper reveals that you shared the train with a group of soccer-hooligans. In other words, a stereotype is activated. What will happen? You may think: "Ah, yes, I remember, the guys rearranging the interior of the train". What details will spring to mind? The yelling and screaming? The torn off waste-paper basket? Hamlet?

The aim of this thesis is to study the impact of stereotypes on memory. More specifically, the question studied is how an a posteriori activated stereotype affects the retrieval of earlier encoded stereotype-consistent and stereotype-inconsistent information?

Stereotypes and retrieval: An overview of the literature

First, an overview will be provided of the research addressing the influence of later activated stereotypes on retrieval of stereotype-consistent and stereotype-inconsistent information. The experiments reviewed roughly employ the same experimental paradigm and the same procedure.

First, subjects receive (behavioral) information about a person or a group of persons (e.g., Hank sometimes fights in bars). Subsequently, additional target information is provided about the social category the person (or group) belongs to (e.g., Hank is a soccer-hooligan). The dependent measure is a memory measure. In most studies, a comparison is made between memory for stereotype-consistent information and stereotype-inconsistent information.

The work of Snyder and Uranowitz

In 1978, Snyder and Uranowitz published an article in which they argue that the memory of past events involving a person is reconstructed in the light of one's current beliefs about that person. They posit that people do not simply remember something by retrieving fixed information. Instead, information in memory is actively reconstructed (cf, e.g., Bartlett, 1932; Dooling & Christiaansen, 1977; Loftus, 1975; Spiro, 1976). "..we do not remember an event by activating or "replaying" some fixed memory trace. Rather, we construct a schematic representation of our past experience by piecing together remembered bits and pieces with new facts that we (knowingly or unknowingly) supply to flesh out or augment our emerging knowledge of the past" (Snyder & Uranowitz, 1978, p. 942). Thus, when we learn something new, these new events are used to reconstruct older information in memory. What we retrieve from memory is biased by our newly acquired knowledge. Snyder and Uranowitz proposed that social stereotypes may be capable of instigating such a reconstruction process. The hypothesis under consideration in their experiment was that subjects would reconstruct information in memory when a stereotype is activated after subjects are presented with information about a person. Furthermore, they expected that the information subjects would retrieve from memory would be biased, in the sense that stereotype-consistent information would be easier to retrieve than stereotype-inconsistent information.

The participants in their study received information about a woman named "Betty K" and were asked to form an impression of this woman. Specifically, subjects read a case history containing, among other things, information about her youth, high school years and relationship with her parents. Later, some subjects were told that Betty K was currently living a lesbian lifestyle, some others were told that she lived a heterosexual lifestyle. A control group was given no additional information.

A week later, the subjects' recognition of the presented stimulus information was measured. Subjects received 36 multiple-choice questions about the information concerning Betty K they had received a week earlier. All questions contained four choice options. The options were chosen in such a way that some answers were consistent with the stereotype of lesbians, some were consistent with the stereotype of heterosexuals and some were neutral with respect to these stereotypes. The question under consideration was whether or not subjects would "reconstruct" the information about Betty K, that is, would they bias the retrieval of this information as a result of the information about her current (lesbian or heterosexual) lifestyle ?

There was evidence indicating that subjects indeed reconstructed their impression of Betty K. Subjects made stereotypical errors during recognition. That is, subjects who were told that Betty K was a lesbian answered more questions in a way consistent with the stereotype of lesbians (suggesting a reconstruction bias in the direction consistent with the stereotype) than did subjects under heterosexual stereotype conditions. Conversely, subjects in the heterosexual stereotype condition made more stereotypically heterosexual errors than did subjects in the lesbian stereotype condition.

Results also revealed that subjects who were led to believe that Betty K was heterosexual, showed better recognition for information that was stereotypically heterosexual than subjects who were led to believe that Betty K was a lesbian and control subjects. This was the only reliable effect on this measure. It indicates that a later activated stereotype may enhance recognition of stereotype-consistent information. However, this conclusion should be treated with caution since subjects who were led to believe that Betty K was a lesbian did not recognize more stereotypically lesbian information than control subjects (or subjects led to believe that Betty K was heterosexual).

Critique on Snyder and Uranowitz

Snyder and Uranowitz's finding that a later activated stereotype may lead to better retrieval of stereotype-consistent information compared to stereotype-inconsistent information was discredited a few years later. First, Clark and Woll (1981) replicated Snyder and Uranowitz's (1978) experiment and found no evidence for effects of stereotypes on memory.

Second, Bellezza and Bower (1981) criticized Snyder and Uranowitz's conclusion that the later activated stereotype leads to biased retrieval. They show in their study that recognition measures (as used by Snyder and Uranowitz) are sensitive to guessing biases[1]. That is, when corrected for guessing the recognition of stereotype-consistent information in the stereotype afterwards condition is no longer superior to that in the no stereotype control condition. What this comes down to is that, in case one wants to study stereotype-induced retrieval biases, a free recall measure would be more appropriate than a recognition measure.

Later research on stereotypes and retrieval

Despite the criticism on the conclusions drawn by Snyder and Uranowitz (1978), the effects they obtained - better memory of stereotype-consistent information than stereotype-inconsistent information after stereotype activation - were replicated by others. In a study conducted by Cohen (1981), subjects watched a videotape about a woman and were later told that, depending on experimental conditions, the woman was either a waitress or a librarian. In a subsequent recognition task, it was found that memory for information consistent with the stereotype was superior to memory for stereotype-inconsistent information. These results were replicated in a second experiment. In sum, Cohen (1981), unlike Clark and Woll (1981), was able to replicate the results of Snyder & Uranowitz (1978).

A study conducted by Lutz (1983) provides further support. Lutz also replicated Snyder and Uranowitz's study. However, in this study, both free recall and recognition were measured. It was shown that subjects indeed recalled information consistent with a stereotype better than information inconsistent with a stereotype. On the recognition measure, the same as used by Snyder and Uranowitz, the data replicated the free recall data. That is, a consistency bias was again obtained. So despite earlier scepticism, it seems that a posteriori stereotype activation affects memory. In most of the studies conducted later, the consistency bias, that is, better retrieval of information consistent with a later activated concept than retrieval of information inconsistent with a later activated concept, could be replicated (Hirt, Erickson & McDonald, 1993: Pyszczynski, LaPrelle & Greenberg, 1988; Wyer, Bodenhausen & Srull, 1984 but see, Belmore & Hubbard, 1987).

In a study by Wyer, Bodenhausen and Srull (1984), subjects received behavioral information about a person or about a group. Afterwards, they activated a trait concept. In their study, a memory advantage of consistent

information (here, consistent with the trait) over inconsistent information was obtained for both person perception and group perception and on both a free recall measure and a recognition measure.

Pyszczynski, LaPrelle and Greenberg (1988) provided subjects with information about events in the life of a fictitional undergraduate student. Some of the events were negative and some were positive. Later, participants were given a "Student Profile" either describing the undergraduate student rather positively or rather negatively. A free recall task revealed that subjects retrieved more consistent information than inconsistent information from memory. In other words, subjects who read the positive profile showed better memory for positive events than for negative events while the opposite was true for students who had read the negative profile.

Hirt, Erickson and McDonald (1993) provided subjects with a list of the midterm exam scores. Later, they manipulated subjects expectancies about the student's future performance (improve versus decline). Subsequently, subjects read about the student's final exam scores. These scores were either consistent or inconsistent with the expectancy. In a free recall task (exp. 1) participants were asked to recall the student's midterm exam scores. Results indicated that the expectancy indeed biased retrieval. Consistent information (expectancy-consistent scores) was retrieved with greater accuracy than inconsistent information (expectancy-inconsistent scores).

The nature of the memory bias

The picture that emerges from most of the studies cited above is that upon a posteriori stereotype activation stereotype-consistent information seems to be recalled and recognized better than stereotype-inconsistent information (see also Rojahn & Pettigrew's, 1992, meta-analysis results). What we do not know, however, is whether stereotype activation makes consistent information easier to retrieve, or whether stereotype activation makes inconsistent information harder to retrieve, or both. In this section, we will try to shed more light on the question whether stereotype activation enhances retrieval of stereotype-consistent information, impairs retrieval of inconsistent information, or both.

Pyszczynski et al. posited that an a posteriori activated stereotype might function as a *retrieval cue* (see Srull & Wyer, 1989; Wyer, Bodenhausen & Srull, 1984). They argue that a later activated stereotype

increases the ability to access previously encoded stereotype-consistent information. This explanation suggests that an a posteriori activated stereotype would enhance the retrieval of stereotype-consistent information. However, whether a stereotype indeed leads to better memory of stereotype-consistent information cannot be determined by the data they report. What they report is that there is a memory advantage of stereotype-consistent information over stereotype-inconsistent information after the activation of a (positive or negative) stereotype. These effects do not warrant the conclusion that stereotype activation enhances the recall of stereotype-consistent information. The obtained memory advantage might just as well have been due to reduced recall of stereotype-inconsistent information. In brief, whether or not an a posteriori activated stereotype enhances recall of stereotype-consistent information, reduced recall of stereotype-inconsistent information, or both, can only be established when one compares memory in the stereotype-afterwards condition with memory in a no stereotype control condition.

If we take a look at the literature discussed earlier, we discover that only a few studies have been conducted studying retrieval effects by comparing a posteriori stereotype activation with a no stereotype control condition. The results of these studies are inconclusive.

As said earlier, Snyder and Uranowitz's (1978) stereotype afterwards versus no stereotype comparisons revealed only one significant effect on recognition of consistent information. Furthermore, Clark and Woll (1981) do not report enhanced recall or recognition of consistent information in the stereotype afterwards condition compared to the no stereotype condition. In their study, they do not obtain a memory bias anyway (that is, under posterior schema activation conditions).

Bodenhausen (1988) used a control condition in which no stereotype was activated. However, in this study, it is hard to determine which behavior is inconsistent with the stereotype and which behavior is consistent with the stereotype. Subjects read information about a criminal act. Information consisted of both incriminating and exonarating evidence. The suspect was either described as "Carlos Ramirez, born in Albuquerque, New Mexico" (stereotype condition) or as "Robert Johnson, born In Dayton, Ohio" (no stereotype activation). It is plausible that subjects treated the exonarating evidence (and the incriminating evidence) as consistent in one experimental condition and inconsistent in the other condition. Hence, it

does not seem warranted to regard the condition with the "neutral" stereotype (Robert Johnson) as a control condition.

In sum, it is not yet clear what causes the memory bias obtained in most experiments discussed above. Thus, it is still possible that a stereotype activated afterwards enhances the retrieval of consistent information, it is also possible that a stereotype reduces the retrieval of inconsistent information, and it is possible that both effects may be obtained.

Summary of the present dissertation

What I set out to do in the present thesis is: 1) To give a more precise factual description of the effect of an a posteriori activated stereotype on earlier encoded stereotype-consistent and stereotype-inconsistent behavioral information than the current literature allows; 2) To provide a tentative theoretical account for the obtained a posteriori stereotype effects; and 3) To present experimental evidence supporting the advanced explanation as well as ruling out potential alternative explanations.

The first experiment to be reported in this thesis (see Chapter 2) was aimed at determining the nature of the memory bias. Does a posteriori stereotype activation enhance memory of stereotype-consistent information, or does it impair memory of inconsistent information, or both? We examined this question by using a recognition paradigm in which an a posteriori stereotype condition was compared with a no stereotype control condition. In this experiment, subjects were provided with behavioral information about two social groups. Under conditions in which the groups were labelled after encoding (as environmental activists or professional soldiers), recognition of stereotype-consistent information was superior to recognition of stereotype-inconsistent information (as was the case in many of the cited studies). More importantly, the comparison of the a posteriori stereotype activation condition with the no stereotype control condition showed a recognition decrease of stereotype-inconsistent behaviors due to afterwards stereotype activation, and no effect at all on the stereotype-consistent behaviors.

As said before, recognition measures may be subject to guessing biases. Therefore, it seemed worthwhile to demonstrate the robustness of the findings of experiment 1 with a more appropriate free recall measure. Hence, in a subsequent experiment (experiment 1 in Chapter 4) we replicated the first experiment while using a recall task to assess memory. The results of this study show that recall of stereotype-inconsistent behavior

deteriorated due to a posteriori stereotype activation, while recall of stereotype-consistent behaviors remained unaffected, which replicates the recognition results of the first experiment. In sum, it seems indeed that the a posteriori activated impairs the recall of stereotype-inconsistent information.

The above experiments show that an a posteriori activated stereotype somehow impedes memory for behavioral information that is inconsistent with the stereotype -- in other words we tend to forget having seen the copy of Shakespeare's Hamlet after we learned that these boys in the train were soccer-hooligans --, while we remember stereotype-consistent behaviors just as well as when no stereotype was activated -- that is, we do remember the yelling and screaming, and the boys tearing off the waste-paper basket irrespective of being informed that they were soccer-hooligans. We obtained evidence for consistency bias in memory using both a recognition and a free recall paradigm, suggesting that the phenomenon is fairly robust.

Having thus established the nature of the phenomenon, we suggested a tentative "guided retrieval" explanation for this memory bias. Our guided retrieval explanation contains five basic propositions. First, it is assumed that behavioral information is encoded and and stored in memory in terms of traits. For instance, the yelling and screaming, the boy ruining the compartment, may all be stored under the stored under the trait concept aggressive, while the possession of the copy of Hamlet may betray intelligence. Second, these trait-behavior clusters may be consistent with an activated stereotype, e.g., soccer-hooligans are expected to be aggressive, or inconsistent with the stereotype, that is, they are not expected to be intelligent. Third, a memory search is presumably guided by trait concepts. We assume that traits, abstract concepts summarizing behavior, serve as starting points for the memory search for behavioral examples related to the trait. For instance, activation of the trait intelligence may bring the memory of having seen the copy of Hamlet to mind. Fourth, a posteriori stereotype activation has the effect of facilitating access to traits that fit in with the stereotype, and of hindering or inhibiting access to stereotype-inconsistent traits (and hence to the behavioral information stored under it). Finally, behaviors that as such are mutually unrelated, e.g., intelligence and aggressive behaviors, are stored in memory in *separate* trait-behavior clusters, while behaviors having conflicting conflicting implications for the same underlying trait dimension (e.g., aggressive and peaceloving behaviors) are stored under the *same* trait-behavior cluster. We would predict on the basis of such a "guided retrieval" theory that a stereotype

hinders retrieval of stereotype-inconsistent behaviors only when these are stored in a separate (stereotype-inconsistent) trait-behavior cluster, but that retrieval of stereotype-inconsistent behaviors would not suffer from stereotype activation when it is stored in memory in a (stereotype-related) trait-behavior cluster together with stereotype-consistent behaviors. The latter means that the soccer hooligan stereotype would hinder access to separately stored intelligent behaviors (e.g., you do not remember the copy of Hamlet), but not access to friendly and peaceful behaviors (e.g., the boy offering you the cigarette).

As our argument entails assumptions concerning the organization of behavioral information in memory either in terms of separate traits for stereotype-consistent and stereotype-inconsistent information or in terms of a shared trait-behavior cluster for stereotype-consistent and directly conflicting stereotype-inconsistent information, we designed an experiment to study this presumed memorial organization of behavioral information.

In this experiment (see Chapter 3), subjects were asked to form an impression of a group of people (soccer-hooligans). Subsequently, they were provided either with stereotype-consistent and stereotype-inconsistent information bearing on the same dimension (aggressive and peaceloving behaviors) or with stereotype-consistent and stereotype-inconsistent behaviors bearing on different trait dimensions (aggressive and intelligent behaviors). Later, they were presented with a free recall task.

The organization of behavioral information in memory in terms of trait-behavior clusters may be inferred from the order in which behavioral items are reproduced in free recall. It is assumed that items that are stored under the same trait-behavior cluster are more likely to be remembered consecutively than items from different trait-behavior clusters (as would, incidentally, follow from Associative Network models of trait-behavior organization in memory). The extent to which stereotype-consistent and stereotype-inconsistent behaviors are consecutively reproduced (or "clustered") in free recall is indicated by a clustering index (Roenker, Thompson and Brown's, 1971, ARC index) and by conditional recall probabilities. Both these measures were used in our 'memorial organization' experiment (Chapter 3) to assess clustering.

It appeared from the results of this experiment that, as predicted, stereotype-consistent and stereotype-inconsistent behavioral items bearing on *different* trait dimensions were clustered in free recall in terms of separate clusters for consistent and inconsistent items, while stereotype-consistent and stereotype-inconsistent items having implications for the

same underlying dimension seemed to be grouped together in the same trait-behavior cluster. In sum, the obtained evidence supported the assumed underlying memorial organization of stereotype-consistent and stereotype-inconsistent behavioral information.

The role of trait-behavior clusters in a posteriori stereotype effects on memory was studied in a subsequent experiment (experiment 2 in Chapter 4). In this experiment, subjects were asked to form an impression of a group. Then, they were presented either with stereotype-consistent and stereotype-inconsistent information bearing on the same dimension or with stereotype-consistent and stereotype-inconsistent behaviors bearing on different trait dimensions. After subjects read the behavioral information, the stereotype was activated for half of the subjects. The other half did not receive this information. Recall data indicated that trait dimensions indeed guided the retrieval process. It was found in the stereotype afterwards condition that, in comparison to the control condition in which no stereotype was activated, recall of stereotype-inconsistent information did not deteriorate when this information was stored under the same trait-behavior cluster as the stereotype-consistent information. However, recall of stereotype-inconsistent information stored separately decreased substantially after a posteriori stereotype activation.

The results obtained suggest, in our interpretation, that a posteriori stereotypes serve to de-activate stereotype-inconsistent trait constructs in memory, thereby impeding recall of stereotype-inconsistent behaviors (but, as the theory specifies, only when these are stored in a separate stereotype-inconsistent trait cluster). The paradigms employed sofar, however, do not fully rule out a strategic explanation, that is, subjects might intentionally select stereotype-consistent items as appropriate responses, and discard retrieved stereotype-inconsistent items as inappropriate. This alternative explanation would require that the subjects realize that the activated stereotype pertains to the group they had received information about a little while ago. If stereotype activation unrelated to the stimulus groups would still lead to deteriorated recall of stereotype-inconsistent behavior, a strategic account would seem implausible.

Whether deteriorated recall of stereotype-inconsistent information ensues from a strategic, deliberate process or from an unintentional process was studied in an experiment in which we altered the stereotype activation manipulation (experiment 3 in Chapter 4). In this experiment, the stereotype activation manipulation was seemingly unrelated to the behavioral information subjects read earlier. First, subjects read about

behaviors of members of a certain group. Subsequently, half of the subjects were asked to help out a colleague and to perform a short task unrelated to the rest of the experiment. They were to think about a professor and to write down anything that came to mind with respect to the lifestyle, behaviors and appearance of a typical professor. After they finished this task, they were presented with a free recall task. The data exactly replicated previous results. Again, in the a posteriori stereotype condition the recall of separately stored stereotype-inconsistent information was significantly worse compared to control subjects that were not requested to think about a professors. As a result, the conclusion can be drawn that deteriorated recall of stereotype-inconsistent information after stereotype-activation is the consequence of an unintentional process. Even when the activated stereotype does not pertain to the behavioral information encoded earlier, recall of this information is affected by the stereotype.

In our view, the a posteriori stereotype suppresses memorial access to stereotype-inconsistent trait-behavior clusters thereby reducing recall of the stereotype-inconsistent behaviors stored under it. Alternatively, however, it may be argued that it is not so much de-activated access to stereotype-inconsistent traits causing the effect, but rather enhanced access to stereotype-consistent traits. In other words, reduced recall of separately stored stereotype-inconsistent behaviors may simply be a byproduct of the subjects preferentially accessing stereotype-consistent traits.

To assess the role of enhanced access to stereotype-consistent traits in producing the reduced recall of stereotype-inconsistent behaviors, an experiment was conducted to study stereotype effects on memory of earlier encoded information which did not contain any stereotype-consistent information to begin with (experiment 4 in Chapter 4). In this study, subjects were provided with information inconsistent with a stereotype (either soccer-hooligans or professors) and with information that was irrelevant with respect to the stereotype. After subjects read the information, the stereotype was activated in the same way as in the experiment summarized above (experiment 3, Chapter 4). The results showed deteriorated recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation to occur even in the absence of stereotype-consistent behaviors. Furthermore, this reduced recall of stereotype-inconsistent behaviors occurred while the a posteriori stereotype did not affect the recall of stereotype-neutral ('irrelevant') behaviors, suggesting suppressed access to stereotype-inconsistent traits.

Finally, the guided retrieval explanation of stereotype-induced impeded recall of stereotype-inconsistent behaviors contains the assumption that stereotype activation inhibits (or de-activates) access to stereotype-inconsistent traits (and, as a consequence, to stereotype-inconsistent behaviors). This inhibited access at the level of traits was subjected to a separate test in Chapter 5.

Three experiments (the experiments in Chapter 5) were designed to study inhibition of inconsistent traits in memory. In all experiments, subjects were primed with a stereotype. In experiment 1, inhibition effects were measured with a lexical decision task. It was found that primed subjects responded slower to stereotype-inconsistent traits in comparison to responses on the same traits made by no-prime control subjects (and compared to the recognition of stereotype-neutral traits), thus corroborating the proposed inhibitory effects of stereotype activation.

In experiment 2, subjects were asked to identify trait words that were hidden in word puzzles. Although the evidence was statistically weak, inhibition effects were again obtained. In this identification task, primed subjects identified inconsistent trait words with greater difficulty than no-prime control subjects. Also, in the stereotype prime condition, stereotype-inconsistent trait words were identified more poorly than stereotype-neutral words. In experiment 3, in which slightly modified puzzles were used, these results were replicated. In the experiments we made use of a positively evaluated stereotype (professors) as well as a negatively evaluated stereotype (soccer hooligans). In sum, these experiment confirmed the notion that stereotype activation inhibits access to inconsistent traits in memory.

Remember that the next day you read in your newspaper that those boys on the train were soccer-hooligans? One does not expect soccer-hooligans to be intelligent, or interested in literature and culture. Therefore, this a posteriori activated stereotype would render the memory of having seen a copy of Shakespeare's Hamlet in the hand of one of the boys inaccessible, since it inhibits access the concept of intelligence. You would remember the destructive and aggressive behaviors, because these are stereotype-consistent. And probably you would also remember the red-haired boy offering you a cigarette. The latter friendly and peaceloving gesture conflicts with aggressiveness, it would therefore be stored under the same trait-behavior cluster and remain accessible in memory even after the activation of the hooligan stereotype.

Note

1. A guessing bias may result from the tendency to react affirmatively to stereotype-consistent items in the recognition task on those occasions on which one does not really remember whether or not one has seen the item.

Chapter 2

Timing of schema activation and memory: Inhibited access to inconsistent information[1]

In the present experiment, recognition of consistent and inconsistent information was measured as a function of time of schema activation. A schema was either activated before or after encoding, or not at all. Schema activation after encoding reduced recognition of inconsistent information while schema activation before encoding enhanced it (in comparison to the no schema control condition). Recognition of consistent information appeared to be unaffected by time of schema activation. It is argued that an a posteriori activated schema inhibits access to inconsistent information. In the Discussion a tentative theoretical explanation is provided.

Most research on the impact of schema activation on information processing focuses on differential memory for consistent and inconsistent information given an activated schema (see Rojahn & Pettigrew, 1922; Stangor & McMillan, 1992, for reviews). Such studies throw light on the *relative* (rather than absolute) memory advantages brought about by schemas. The effects of additional variables, such as overload or distraction, may further enable one to reconstruct the way in which schemas function in the encoding and retrieval of information.

Yet, the most direct way to disentangle encoding and retrieval effects of schemas seems to be (1) the comparison of memory of consistent and inconsistent information between a condition in which a schema is activated prior to information presentation and a condition in which a schema is activated after encoding (prior to the retrieval or recognition task) and (2) the comparison between a schema activated afterwards condition and a no schema control condition. The control condition seems crucial. Since in a no schema control condition it remains undefined what is schema-consistent and what is schema-inconsistent, neither encoding nor retrieval can be affected by the schema. In a condition in which a schema is activated after the presentation of stimulus information (prior to the memory task), there cannot have been a differential encoding effect, but schema-consistent information may benefit from the schema in the retrieval (or recognition) process, whereas retrieval (or recognition) of schema-inconsistent information may be impaired due to the a posteriori activated schema. Thus, the comparison of the effects of a schema

afterwards condition with a no schema control condition would reveal pure retrieval and/or recognition effects of the schema.

It may be argued that a schema activated before the presentation of stimulus information plays a role both in the *encoding* phase and, if the recall or recognition task immediately follows the stimulus presentation phase, in the *retrieval* and in the *recognition* of information. Therefore, the comparison of a prior schema condition with a schema afterwards condition would be directly indicative of the pure encoding effects of the schema.

The comparison between prior schema activation conditions and schema afterwards conditions is made by several researchers. Most investigators obtain a better memory for inconsistent information in prior schema activation conditions compared to a posteriori schema activation conditions (Bodenhausen, 1988; Pyszczynski, LaPrelle & Greenberg, 1987; Wyer, Bodenhausen & Srull, 1984; but see Belmore & Hubbard, 1987). As argued above, this suggests that prior schema activation leads to better encoding of inconsistent compared to consistent information. Most investigators agree that this effect is due to the heightened attention that is given to unexpected, inconsistent information (cf. Hastie, 1980; Wyer & Srull, 1989), because more effort is needed to integrate this information in an impression than to integrate expected, consistent information. This explanation is supported by the finding that the superior recall of inconsistent information disappears when subjects are prevented from forming an impression (that is, when subjects are prevented from encoding the information thoroughly), for instance by manipulating overload situations (Dijksterhuis & Van Knippenberg, 1995b; Macrae, Hewstone & Griffiths, 1993; Srull, 1981; Stangor & Duan, 1991).

Few studies have been conducted studying retrieval effects by comparing a posteriori schema activation with a no schema condition. Snyder and Uranowitz's (1978) schema afterwards-no schema comparisons revealed only one marginally significant effect on recognition of consistent information. This effect, however, may be accounted for by guessing biases (see Bellezza & Bower, 1981). Furthermore, Belmore and Hubbard (1987) and Clark and Woll (1981) do not report enhanced recall or recognition of consistent information in the schema afterwards condition compared to the no schema condition. On the other hand, a posteriori schema activation does seem to affect retrieval. Most studies investigating the impact of a posteriori schema activation, without using a comparison with a no schema control condition, obtain a retrieval advantage for consistent information over inconsistent information (e.g. Bodenhausen, 1988; Cohen, 1981; Hirt,

Erickson & McDonald, 1993; Pyszczynski, LaPrelle & Greenberg, 1987; Snyder & Uranowitz, 1978; Wyer, Bodenhausen & Srull, 1984). As argued above, however, the latter studies are inconclusive with regard to whether there is a retrieval advantage for schema-consistent, or a retrieval disadvantage for schema-inconsistent information, or both.

In sum, while the literature suggests that schema activation leads to better encoding of schema-inconsistent information, the pure retrieval or recognition effects of schema activation are still unclear. The main purpose of the present study is to provide a test of encoding and retrieval effects of time of schema activation by making the comparison between memory under the influence of a posteriori schema activation with memory under prior schema activation conditions and memory under no-schema control conditions.

Method

Subjects and design

Sixty undergraduate students of the Social Sciences Faculty of the University of Nijmegen participated in the experiment. Subjects were randomly assigned to three conditions: a schema-before condition (stimulus groups were labeled environmental activists and professional soldiers before the behavioral information was given), a schema-after condition (stimulus groups were labeled environmental activists and professional soldiers after the behavioral information was given, but before the measurement of the dependent variables), and a no-schema condition (the stimulus groups were designated A and B without further labeling throughout the experiment).

Construction of the stimulus material

A pilot-study was conducted to select descriptively consistent and descriptively inconsistent information for two social groups. Twenty-three subjects rated the selected descriptions on two ten-point scales, one measuring the degree of stereotypicality for environmental activists, the other measuring the degree of stereotypicality for professional soldiers. A high score indicated a high level of consistency with the stereotype, a low score represented an inconsistent description. A selection was drawn, to obtain neutral, moderately consistent descriptions and moderately inconsistent descriptions.

Subsequently, booklets were constructed in which one behavioral description was presented on each page. All descriptions were accompanied by first name and group membership (e.g. "John, a member of group A, often visits rock concerts"). To avoid male/female categorizations and also because a female professional soldier might be perceived as inconsistent, only male names were used. All booklets contained 36 descriptions (24 for group A and 12 for group B)[2]. For half of the subjects, the large group (24 descriptions) contained environmental activists. For the remaining subjects the large group contained professional soldiers. The labels A and B were counterbalanced. The order of presentation of the descriptions was randomly determined in each booklet.

For every group in any stimulus set, half of the descriptions were descriptively neutral. For every group, one-fourth of the descriptions was descriptively consistent with the group label and one-fourth was descriptively inconsistent with the group label. All items assigned to one group in the stimulus set were descriptively neutral for the other group. For subjects in the schema-before condition, the booklet started with a message stating that group A (B) consists of environmental activists and that group B (A) consists of professional soldiers. For both the no-schema and the schema-after condition, the behavioral information was provided for groups A and B without additional information. The subjects in the schema-after condition were informed on the first page of the questionnaire that group A (B) consisted of environmental activists and that group B (A) consisted of professional soldiers.

Procedure

Subjects were told that they were participating in an experiment on information processing. They were informed that they would receive information about two real groups. They were asked to form impressions of the groups while reading the information. Subjects were not allowed to turn to earlier pages. Furthermore, subjects were told that the names of the stimulus persons were fictitious.

After they read the descriptions, subjects were given a questionaire containing the dependent measures. After participants had completed this questionnaire, they were paid and debriefed.

Dependent measures

The behavioral descriptions were again presented (in a different order compared to the stimulus material), now without mentioning the name of the person and the group membership (e.g. "A member of group ..... often visits rock concerts"). Subjects were asked to indicate the group membership

of the person who performed each behavior, by simply filling in an A or a B in the blank space. The list was used to calculate the percentages of the correctly attributed descriptively consistent and inconsistent behaviors.

Results

A 2 (relative group size) x 3 (time of schema activation) between-subjects x 2 (consistency of items) within-subjects ANOVA revealed that the time of schema activation x consistency of items interaction was indeed significant ($F(2,54)=5.36$, $p < .01$, see Table 1 for means). Tests of simple main effects show that there were no significant differences between schema conditions for consistent items, while these differences were highly significant for inconsistent items ($F(2,57)= 8.50$, $p < .001$). Planned comparisons revealed that the recognition of schema-inconsistent items in the prior schema condition was clearly better than in the schema afterwards condition ($F(1,57)=12.53$, $p < .001$), indicating that schema activation leads to preferential encoding of schema-inconsistent information, thereby replicating earlier findings (Bodenhausen, 1988; Pyszczynski, LaPrelle & Greenberg, 1987; Wyer, Bodenhausen & Srull, 1984). Furthermore, recognition of schema-inconsistent under prior schema conditions was slightly better than in the no schema condition ($F(1,57)=3.46$, $p < .07$). In addition, the schema-inconsistent items were better recognized in the no schema condition than in the schema afterwards condition ($F(1,57)=4.09$, $p < .05$), which indicates that a posteriori schema activation results in deteriorated retrieval of inconsistent information.

Table 1. Recognition of *descriptively* schema-consistent and -inconsistent behavioral descriptions (percentages).

	behavioral descriptions		
schema activation	consistent	inconsistent	mean
no schema	66.1	70.0	68.1
schema afterwards	69.1	61.7	65.4
prior schema	70.0	81.1	75.6

Within-cell comparisons revealed a better recognition of consistent information over inconsistent information in the schema afterwards condition ($F(1,57)= 4.43$, $p < .04$), while the reverse was true in the prior schema condition ($F(1,57)= 6.13$, $p < .02$). No difference between recognition of consistent and inconsistent information was found in the no schema control condition ($F(1,57)= .26$, n.s.).

Recognition tasks may give rise to guessing biases. (Bellezza & Bower, 1981; Stangor & McMillan, 1992). For instance, subjects may have assigned behaviors to groups on the basis of the consistency of the behavior with the group. In order to circumvent potential bias effects in our recognition (or rather, allocation) task we used the sensitivity measure d', borrowed from signal detection theory (see, e.g. McNicoll, 1972). This measure, originally used as an index of signal-noise differentiation, may - when applied to item allocation to target groups - be interpreted as a measure of how well subjects are able to distinguish or differentiate correctly between the target groups. The advantage of d' compared to the above raw measure of correct allocation is that it is unaffected by allocation biases.

Table 2. Signal-detection analysis: d'-scores.

	behavioral descriptions	
schema activation	consistent	inconsistent
no schema	1.39	2.51
schema afterwards	1.73	1.49
prior schema	1.46	3.24

The mean d'-scores are summarized in Table 2. First, there is a main effect of schema activation on d' (F (1,57)= 6.14, $p < .02$) revealing, on average, higher differentiation scores in the prior schema condition compared to the other conditions (particular compared to the schema afterwards condition). Although the interaction of schema activation by item consistency is only marginally significant (F (2,57)= 2.84, $p < .07$), the means in Table 2 show that the above main effect only holds for inconsistent items (F (2,57)= 3.69, $p < .04$) and not for consistent items (F (2,57)= .17, n.s.). It appears that a prior activated schema leads to better differentiation between target groups on inconsistent items, suggesting an encoding advantage for inconsistent items. Furthermore, a schema

afterwards seems to impair correct differentiation compared to the no schema control condition, suggesting a retrieval or recognition disadvantage for inconsistent items due to schema activation. On the whole, these results corroborate the analysis of correct recognition scores reported above.

Discussion

In line with several other experiments (e.g. Hastie & Kumar, 1979; Pyszczynski et al. 1987; Wyer et al. 1984) we obtained evidence for the idea that prior schema activation leads to preferential encoding of inconsistent information. Recognition of inconsistent information in the prior schema condition seemed indeed better than recognition of inconsistent information in the schema afterwards conditions.

Results under conditions with a posteriori schema activation are interesting. While recognition of consistent information remained unaffected, the schema afterwards versus no schema manipulation strongly affected the recognition of schema-inconsistent information. When schemas were activated after the presentation of behavioral information, memory for schema-inconsistent information was substantially reduced compared to the control condition in which no schemas were evoked.

The problem to be dealt with would be how this reduced recognition could be theoretically explained. First, it should be emphasized that encoding is the same for both the no schema and the schema afterwards condition. Because consistent and inconsistent information is not defined as such during encoding when no schemas are activated, there is no reason to assume that some information is encoded more thoroughly or more efficiently than other information. The results confirm this idea, as recognition in the no schema condition was virtually the same for schema-consistent and schema-inconsistent information. Hence, what remains to be explained is why recognition of inconsistent information is obstructed by an a posteriori activated schema.

To formulate a theoretical explanation is, considering the present literature, quite difficult. However, an explanation of inhibited access to inconsistent information in terms of associations among behaviors can be postulated. Srull and Wyer (1989; see also Hamilton, Driscoll & Worth, 1989; Hastie, 1980) assume that the processing of information without prior schema activation will result in a self generated representation. In this representation, behavioral descriptions are clustered in terms of trait-

dimensions. Statements as "lends money to a friend" and "helps an old man crossing the street" may be clustered around the trait concept of "helpful". In a subsequent retrieval process the search in memory is guided by these trait concepts. In the no schema control condition, the recall probability of consistent information and inconsistent information is, theoretically, the same since (in)consistency is not defined in this condition. In case of a posteriori schema activation, some trait-behavior clusters will appear to be inconsistent with the schema. That is, if a given trait-behavior cluster only contains inconsistent behaviors, because no or very little consistent information with implications for the same trait is provided, this trait as such may be perceived as inconsistent with the schema. It may well be that access to this trait is inhibited by activating a conflicting schema. Because search in memory is guided by the traits represented in the schema, it may be assumed that the retrieval probability of inconsistent behaviors clustered in inconsistent traits is very low. This explanation is in line with the results of Fazio, Sanbonmatsu, Powell & Kardes (1986). In their study, participants were asked to classify words with respect to their valence (positive versus negative). Three-hundred milliseconds before subjects were presented with these words, a positive or a negative attitude was primed. In comparison to control subjects who were not primed, subjects in the priming condition responded slower to words that were inconsistent with the primed attitude. In sum, attitudes may inhibit access to information that is inconsistent with this attitude. Our data may point at a similar effect of stereotypes.

In recent experiments (van Knippenberg & Dijksterhuis, 1996, Chapter 4), the phenomenon of inhibited access due to a posteriori schema activation, described in this article, is replicated in a free recall paradigm. Of course, inhibited access due to a posteriori schema activation requires further study. First, its robustness may be established by other replications in recognition as well as free recall paradigms. More importantly, further research may shed some light onto the nature of the underlying processes, particularly as regards the reorganization of information after a posteriori activated schemas and the effects of the latter on the search process.

Notes

1. This chapter was published as Dijksterhuis and van Knippenberg (1995a).
2. Relative group size was varied in order to study effects on illusory correlation. These effects are, however, not reported here.

Chapter 3

Trait implications as a moderator of recall of stereotype-consistent and stereotype-inconsistent behaviors[1]

The assumption was tested that organization in memory of behavioral information and recall depends on the descriptive relatedness of consistent information with inconsistent information. Subjects were provided with stereotype-consistent and stereotype-inconsistent behavioral descriptions implying the same trait dimension (e.g., intelligent and stupid behaviors) or different trait dimensions (e.g., intelligent and aggressive behaviors). It was hypothesized that in case stereotype-inconsistent behaviors would be associated with consistent behaviors because of shared trait implications, these behaviors would be recalled better than stereotype-consistent behaviors. Conversely, it was expected that in case subjects were provided with inconsistent information that, because of differential trait implications, could not be associated with consistent information, this inconsistent information would be stored separately and recall of this information would be worse than recall of consistent information. These predictions were corroborated in a free recall task. Furthermore, conditional recall probabilities and ARC-scores provided support for the proposed underlying organization of information in memory.

Our knowledge of the way in which people form impressions of persons and groups increased substantially during the past two decades (see e.g., Brewer, 1988; Fiske & Neuberg, 1990). Research on impression formation has been dominated by a debate on memory for consistent and inconsistent information. (e.g., Hastie & Kumar, 1979; Rothbart, Evans & Fulero, 1979; for reviews see Fyock & Stangor, 1994; Rojahn & Pettigrew, 1992; Stangor & McMillan, 1992). In an influential study conducted by Hastie and Kumar, subjects were presented with a brief description of a person. This description consisted of a series of trait adjectives that were expected to create a strong initial impression. Subsequently subjects were asked to read a series of behavioral descriptions about the person. Some of these behaviors were consistent with the initial impression, some were inconsistent and some were irrelevant. Results obtained with a free recall task showed that inconsistent behaviors were recalled with a higher probability than consistent behaviors.

This effect, replicated many times (see the reviews mentioned above), is ascribed to differential encoding of consistent and inconsistent information. Consistent information is expected and is encoded without much effort. Inconsistent information however, is encoded more thoroughly because such behavior is unexpected (Crocker, Hannah & Weber, 1983). To incorporate inconsistent information in an impression, it is related to and compared with earlier encoded behaviors (Hamilton, 1988; Hastie, 1984; Sherman & Hamilton, 1994). This process of comparing inconsistent information with other, earlier encoded information, results in a high number of associative links between inconsistent information and other information. This, in turn, leads to superior recall of this information. The "effort explanation", that is, the idea that recall of inconsistent information is superior to that of consistent information due to more effortful encoding of inconsistent information, is supported by the finding that the memory advantage of inconsistent information dissappears when subjects are prevented from forming an impression during encoding, for instance, by increasing cognitive load, task complexity or processing pace (Bodenhausen & Lichtenstein, 1987; Dijksterhuis & van Knippenberg, 1995b; Macrae, Hewstone & Griffiths, 1993; Srull, 1981; Stangor & Duan, 1991).

The theoretical explanation in terms of associative links formed during encoding has led to the development of more general associative network models for impression formation (e.g., Hamilton, Driscoll & Worth, 1989; Hastie, 1980; Srull, 1981; Srull & Wyer, 1989; Wyer & Srull, 1989). In these models, the target person or group is represented by a node (a central person concept or a schema or stereotype). The behavioral information that is encoded is connected to this node, by which consistent behaviors are connected more strongly to the node than inconsistent information (Srull, 1981). Furthermore, all models posit that behavioral information is organized in memory with the help of trait dimensions. Behaviors with strong implications for the same trait are clustered together under the same trait dimension (e.g., Driscoll, 1992; Hamilton, Katz & Leirer, 1980a; 1980b; Hamilton, Driscoll & Worth, 1989; Hastie, 1980; Srull, 1983; Srull & Wyer, 1989). These trait-behavior clusters may be conceived of as subnodes and are in turn associated with the central person concept (or the schema or stereotype). From associative network models some specific predictions concerning retrieval of consistent and inconsistent information may be derived. First, as argued above, the recall probability of inconsistent information is higher than the recall probability of consistent information, because inconsistent behaviors share more associative links with other

behaviors in a given trait-behavior cluster than do consistent behaviors. Second, the probability that a consistent behavior is retrieved from memory when the previously recalled behavior is also consistent is small, due to the absence of direct links between consistent behaviors. Given the recall of a consistent behavior, the probability that the next behavior to be recalled will be inconsistent is relatively high. Since inconsistent behaviors are connected with both consistent and inconsistent behaviors, the probability that an inconsistent behavior is followed by a consistent behavior is about the same as the probability of recalling another inconsistent behavior (Srull, 1981). Third, the recall probability of a given behavior is higher when the previously recalled behavior was retrieved from the same cluster than when the previous recalled behavior emanated from a different cluster (Driscoll, 1992; Hamilton, Katz & Leirer, 1980a; Hamilton, Driscoll & Worth, 1989).

Associated and dissociated inconsistent information

So far, we used the terms consistent and inconsistent to characterize the relation between an expectancy and a behavioral description. However, an inconsistent (or a consistent) behavior can be inconsistent (or consistent) in many respects. First, a behavior can be *evaluatively* inconsistent with a stereotype (or an expectancy). For instance, a member of a positively evaluated group performs negatively evaluated behavior. Second, an inconsistent behavior can be *descriptively* inconsistent with a stereotype. For example, a member of a group generally believed to be honest, may be observed to perform dishonest behavior. These different types of (in)consistency have received much attention in the literature (e.g., Hastie, 1980; Srull & Wyer, 1989; Wyer, Bodenhausen & Srull, 1984; Wyer & Gordon, 1982; Wyer & Martin, 1986; Wyer & Srull, 1989; see also, Hamilton, Driscoll & Worth, 1989).

However, we will focus on a third form of (in)consistency. Stereotype-inconsistent and stereotype-consistent behaviors (in an evaluative and descriptive sense) can have implications for the same trait dimension (e.g., intelligent and stupid behaviors). In this case, they are descriptively related, and therefore *inconsistent with each other.* Alternatively, consistent and inconsistent behaviors can have implications for different trait dimensions (e.g., intelligent and aggressive behaviors). Here, the behaviors are descriptively unrelated and *not inconsistent with each other.* This distinction between descriptively unrelated and related

behaviors may well have implications for the underlying organization of inconsistent and consistent information in memory (and for the process of "inconsistency resolution", that is, the tendency to "explain away" inconsistent behaviors) and hence, for memory for consistent and inconsistent information[2].

Two concrete examples may clarify our argument. Note that in both examples, the inconsistent behavior is evaluatively as well as descriptively inconsistent with stereotypical expectations. First, imagine that, given that the stimulus group consists of professors known to perform intelligent behaviors (e.g., brilliant chess playing), you come across one who performed behavior suggesting lack of intelligence (e.g., very bad marks in high school). In this example, the consistent and inconsistent behaviors are related because they bear on the same trait-dimension: they are inconsistent with each other. This situation is likely to evoke efforts to explain the inconsistency (e.g., something in the school system that demotivates intelligent youngsters). As a result of explanatory efforts inconsistent behaviors which directly conflict with consistent information become strongly linked to the consistent behaviors in memory. Now consider an example of unrelated inconsistent behavior. Again, the stimulus group consists of professors, known to perform intelligent behaviors. Suppose one encounters a behavior that implies aggression (e.g., enjoys fighting in pubs). This may elicit a different encoding process. Of course, fighting in pubs is without doubt inconsistent with the stereotype of professors. However, it is not necessarily in contradiction with intelligence. In this case, inconsistent behaviors are still (evaluatively and descriptively) inconsistent with the stereotype, but they are *not* inconsistent with the consistent behaviors. Therefore, there is not much need to relate this inconsistent behavior to consistent behaviors. In sum, the probability that people engage in a process of inconsistency resolution ("explaining away" the occurence of inconsistent occurences) will be greater in the first case than in the second.

As argued earlier, behaviors implying the same trait dimension seem to be stored together (Driscoll, 1992; Hamilton, Katz & Leirer, 1980a; Hamilton, Driscoll & Worth, 1989). In case consistent information and inconsistent information do share trait implications (that is, they are descriptively related), for instance, all consistent behaviors imply intelligence and all inconsistent behaviors imply stupidity, these behaviors are stored within the same trait-behavior cluster sharing many inter behavior associations. Here, inconsistent information is *associated* with

consistent information, resulting in a superior recall of inconsistent information over consistent information.

However, when consistent and inconsistent information imply different trait dimensions, for instance, all consistent behaviors imply intelligence and all inconsistent behaviors imply aggressiveness, this information is stored separately. In other words, inconsistent information would then be *dissociated* from the cluster containing consistent behaviors. Here, retrieval would be guided by different trait-behavior clusters between which no interbehavior links exist (cf. Hamilton, Driscoll & Worth, 1989; Srull, 1983). Recall of inconsistent information may well be worse, as one might expect the consistent trait-behavior cluster (e.g., all intelligent behaviors), because of its consistency, to be associated more strongly with the central person concept or the stereotype than the inconsistent trait-behavior cluster (e.g., all aggressive behaviors)

The idea that the organization in memory and the recall of inconsistent behavioral information depends on the storage of this inconsistent information (associated vs dissociated) or, in other words, depends on the presence of consistent behaviors having implications for the same trait dimension, has not been empirically addressed sofar. Although in some studies a disctinction is made between single-trait and multi-trait impression formation (e.g., Driscoll, 1992; Hamilton, Driscoll & Worth, 1989; Wyer & Gordon, 1982), these studies do not address the difference between associated and dissociated behaviors. In these experiments, under single-trait conditions subjects are presented with a stimulus set in which all behaviors are loaded on the same trait dimension (e.g., intelligent and stupid behaviors). Under multi-trait conditions, the stimulus set consists of different groups of behavioral descriptions that are loaded on different trait dimensions (e.g., intelligent and stupid behaviors, and friendly and unfriendly behaviors, and extroverted and introverted behaviors in the same stimulus set). However, in these studies, inconsistent information bearing on a certain trait dimension is always accompanied by consistent information loaded on the same dimension. Hence, the crucial difference between our study and the studies referred to above is that in the latter experiments stimulus conditions providing inconsistent behaviors not sharing trait implications with consistent behaviors (dissociated behaviors) are not incorporated. These studies address the difference between a relatively simple impression formation process (single-trait) and a more complex and more demanding impression formation process (multi-trait). However, these studies do not shed light on the way inconsistent

information not sharing trait-implications with consistent information is processed and retrieved.

The purpose of the present study is to test the idea that the organization of behavioral information and subsequent recall of this information depends on the stimulus configuration in terms of trait dimensions. When inconsistent behaviors share trait implications with consistent behaviors (i.e. associated inconsistent behaviors) we expect this information to be stored under a single trait-behavior cluster and, therefore, to be recalled better. However, when inconsistent information does not share trait implications with consistent behaviors (i.e. dissociated inconsistent behaviors) we expect this inconsistent behaviors to be stored under a different trait-behavior cluster, separated from consistent behaviors and, therefore, to be recalled worse.

To test these ideas, subjects were provided with behavioral descriptions about a social group. Consistent information presented to the subjects was under all experimental conditions evaluatively and descriptively consistent with the stereotype, while inconsistent behaviors were under all experimental conditions evaluatively and descriptively inconsistent with the stereotype. The crucial factor, then, is descriptive relatedness of the inconsistent information with the consistent information. After subjects read the behavioral descriptions, recall of consistent and inconsistent information was measured. Furthermore, conditional recall probabilities and ARC-scores (Adjusted Ratio of Clustering) were measured to shed light on the underlying organization in memory. Under conditions where behaviors are dissociated, recall probabilities are expected to reveal storage in different trait-behavior clusters (cf. Hamilton, Driscoll & Worth, 1989). In concrete terms we expect the probability that a consistent behavior will be followed by another consistent behavior (C-C) and the probability that an inconsistent behavior will be followed by another inconsistent behavior (I-I) to be greater under two-trait conditions than under one-trait conditions, (because direct links between consistent and inconsistent behaviors are supposed to be absent under two-trait conditions, which should lead to relatively high C-C and I-I probabilities). In terms of ARC-scores, we expect consistent information on the one hand and inconsistent information on the other hand, to be clustered to a higher degree under conditions where behaviors are

dissociated (two-trait) compared to conditions under which behaviors are associated (one-trait).

Method

Subjects and Design

Forty-eight undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (number of trait dimensions in the stimulus material: 1- consistent and inconsistent information loaded on the same trait dimension vs 2- consistent and inconsistent information loaded on different dimensions) x 2 (target: soccer-hooligans vs professors) x 2 (stimulus set: the aggressive/peaceloving set vs the intelligent/stupid set under one-trait conditions and the aggressive/intelligent set vs the stupid/peaceloving set under two-trait conditions)[3] between-subjects design. In Table 1 a schematic overview of the design is provided. Subjects received Dfl. 5 (approx. 3 US$) for participating.

Pretesting of stimulus materials

Thirty-three subjects (other than the experimental subjects) rated fourteen social groups on fourteen trait dimensions. Nine-point scales were used with poles labeled "members of this group are not at all...(1)" and "members of this group are very...(9)". To avoid a valence-consistency confounding (e.g., because of possible positive-negative asymmetries, see e.g., Ikegami, 1993; Reeder & Brewer, 1979; Skowronski & Carlston, 1987; Vonk, 1993), two groups were selected with opposite scores. This way, we were able to construct stimulus sets in which both consistent and inconsistent behaviors could be either positive or negative. Professors were perceived as intelligent (M=7.79), as peaceloving (M=7.12), and as not stupid (M=1.81) and not aggressive (M=2.98) and hooligans were perceived as aggressive (M=8.75), as stupid (M=7.85), and as not peaceloving (M=1.50) and not intelligent (M=1.87). Therefore, we chose the dimensions "intelligent-stupid" and "aggressive-peaceloving". Subsequently, forty other subjects rated 98 behaviors on intelligence, stupidity, peacelovingness and aggressiveness. Nine-point scales were used with poles labeled "performing this behavior is not at all (e.g., intelligent) (1)" and "performing this behavior is very (e.g., intelligent) (9)". Thirty behaviors were selected of which 6 were intelligent, 6 were stupid, 6 were aggressive, 6 were peaceloving and 6 were irrelevant. Behaviors that were loaded on one trait dimension, were neutral with respect to the other trait dimension (see Table 2 for means).

Table 1. Design of the experiment.

	Target: Professor	Target: Soccer-hooligan
Behavior:	consistent/inconsistent	consistent/inconsistent
Number of traits:		
1 trait in stimulus material (descriptively related)	intelligent/stupid (stimulus set 1)	stupid/intelligent (stimulus set 1)
	peaceloving/aggressive (stimulus set 2)	aggressive/peaceloving (stimulus set 2)
2 traits in stimulus material (descriptively unrelated)	intelligent/aggressive (stimulus set 3)	aggressive/intelligent (stimulus set 3)
	peaceloving/stupid (stimulus set 4)	stupid/peaceloving (stimulus set 4)

Four stimulus sets were constructed with 6 consistent descriptions, 6 inconsistent descriptions and (for all sets the same) 6 neutral filler-items. In two sets, consistent and inconsistent behaviors had implications for the same trait dimension (either intelligent and stupid behaviors, or aggressive and peaceloving behaviors). In the two remaining sets, consistent and inconsistent behaviors were loaded on different dimensions (intelligent and aggressive behaviors, stupid and peaceloving behaviors). The design is a 2 (target: professors vs soccer-hooligans) x 2 (number of traits: 1 vs 2) x 2 (stimulus set) design, with 'stimulus set' nested under 'number of traits'.

Table 2. Stimulus material (ratings on nine-point scales ranging form 1 to 9)

	intelligence	stupidity	aggressiv.	peacelovingness
intelligent items	7.12	2.12	4.32	5.95
stupid items	2.98	7.17	5.16	4.23
aggressive items	4.41	6.06	7.36	2.37
peaceloving items	5.45	4.13	2.72	7.25
fillers	5.06	4.72	4.96	4.61

Procedure

Subjects attended the experiment in groups up to 7 persons per session. They were placed in individual cubicles containing an Apple Macintosh computer, which was used to provide all information concerning the experiment. They were asked to read a series of behavioral descriptions about members of a group of professors (or soccer-hooligans) and to form an impression of this group. Subjects did not know in advance that they would be presented with a free recall task. All descriptions were accompanied by different first names. In all conditions, the first two items as well as the last two items to appear on the screen, were fillers. All other items were presented in random order and subjects were allowed to read the behaviors in their own pace. After completion of the reading task and after a one-minute break, subjects were presented with a free recall task. Subsequently subjects were thanked, paid and debriefed.

Dependent variables

After reading the behavioral information, subjects were asked to write down as many of the behavioral descriptions as possible. They were given six minutes to complete this task. These free recall data were also used to calculate conditional recall probabilities.

Results

Recall

In case inconsistent behaviors share trait implications with consistent behaviors we expect this information to be recalled better than consistent information, because the inconsistent information is associated, that is, all information is stored under a single trait-behavior cluster. In case inconsistent information does not share trait implications with consistent

behaviors we expect this inconsistent behaviors to be stored under a different trait-behavior cluster, dissociated from consistent behaviors and, therefore, to be recalled worse in comparison to consistent information.

Since the order of presentation of the irrelevant filler items was not random (see Procedure), data of these fillers are not included in our analyses, simply because one cannot compare these data with the data on consistent and inconsistent behavioral descriptions.

The number of correctly recalled consistent and inconsistent descriptions were counted for each subject. An item was counted as correct if the general meaning of the original item was reflected (cf. Gordon & Wyer, 1987; Hastie & Kumar, 1979; Srull, 1981; 1983). Subsequently, the number of correctly recalled consistent and inconsistent items was divided by the number of that type of item in the stimulus set (i.e. a proportion of .50 for recall of consistent information indicates that 3 out of the original 6 consistent behaviors were recalled). The resulting proportions were subjected to a 2 (number of traits in the stimulus material) x 2 (target) x 2 (stimulus set, nested under number of traits) between-subjects x 2 (type of behavioral description) within-subjects ANOVA. We obtained an interaction of number of traits with type of behavioral description (F (1,40)= 12,46, $p < .002$). As expected, associated inconsistent behaviors (i.e. inconsistent behaviors under one-trait conditions) were recalled better than consistent behaviors (F (1,40)= 8.55, $p < .01$), while the reverse effect was obtained for dissociated behaviors (F (1,40)= 4.70, $p < .04$, see Table 3 for means). No other main effects or interactions were found. None of the interactions indicating differential effects for target (professor vs soccer-hooligan) were reliable, and neither were the nested stimulus set effects (cf. Winer, 1970, p .185).

Table 3. Recall (percentages).

	consistent	inconsistent
1 trait	46.4	62.3
2 traits	60.0	48.7

Conditional recall probabilities and clustering

Conditional recall probabilities were calculated to examine organization in memory. We predicted that the probability that a certain behavior will be recalled is higher when the previously recalled description is stored under the same trait-behavior cluster (cf. Hamilton, Driscoll & Worth, 1989; Srull, 1983). Under conditions in which the information is stored under two separate clusters, the recall data should show higher probabilities of consistent items following consistent items (C-C) and inconsistent items following inconsistent items (I-I) than under conditions where the information was clustered under a single cluster.

Table 4. Conditional recall probabilities (C=consistent, I=inconsistent)

previous behavior	C		I	
subsequent behavior	C	I	C	I
1 trait	.17	.42	.39	.31
2 traits	.49	.30	.23	.51

The results of 2 subjects could not be analyzed, because one or more inter-item sequences did not occur in their recall protocols. Data of the remaining participants were subjected to a 2 (number of traits in the stimulus material) x 2 (target) x 2 (stimulus set, nested under number of traits) between-subjects x 2 (previous item: consistent vs inconsistent) x 2 (subsequent item: consistent vs inconsistent) within-subjects ANOVA which resulted in a 3-way interaction of number of traits x previous item x subsequent item (F (1,38) = 14.76, $p < .001$). The cell means are shown in Table 4. As expected, under conditions with two trait dimensions, C-C and I-I probabilities were higher than under one-trait conditions (for C-C, F (4,35)= 14.95, $p < .001$; for I-I, F (4,35)= 5.75, $p < .03$). Again, no reliable effects were obtained that indicated differential effects for different targets or for different stimulus sets.

ARC-scores

Despite the fact that conditional probabilities are informative about the underlying representation of information in memory, they cannot simply be interpreted as clustering scores. Therefore, we used the recall data to calculate ARC-scores as well. Two ARC-scores were computed for each

subject, one representing the degree of clustering of consistent items and one representing the degree of clustering of inconsistent items. These two scores were subjected to a 2 (number of traits in the stimulus material) x 2 (target) x 2 (stimulus set, nested under number of traits) between-subjects x 2 (ARCcon vs ARCinc) within-subjects ANOVA. As predicted, a main effect of number of traits was obtained. Consistent information and inconsistent information was clustered to a higher degree under two-trait conditions (ARCcon= .21 and ARCinc= .28) than under one-trait conditions (ARCcon= .16 and ARCinc= .01; F (1,40)= 6.76, $p < .02$). No other effects were obtained.

Discussion

In line with earlier research (e.g., Hamilton, Driscoll & Worth, 1989; Hastie, 1984), the present results suggest that the way stereotype-related behavioral information is organized in memory in terms of trait-behavior clusters does affect recall. On the basis of pre-test results a distinction was made between stereotype-consistent and stereotype-inconsistent behaviors bearing on the same trait at the one hand (descriptively related, such as intelligent and stupid behaviors), and stereotype-consistent and stereotype-inconsistent behaviors having implications for different traits at the other hand (descriptively unrelated, such as intelligent and aggressive behaviors). As predicted, it was found that inconsistent information that, presumably, became associated with consistent information during encoding because of shared trait implications was significantly better recalled than consistent information. Conversely, recall of dissociated inconsistent information, that is stereotype-inconsistent information not linked to consistent information due to different trait implications, was significantly worse than recall of consistent information. Trait-behavior clustering of social information thus seems to moderate recall of behavioral information.

When subjects are provided with stereotype-consistent and stereotype-inconsistent behavioral information with implications for different trait dimensions, inconsistent behaviors are assumed not to be associated with consistent behaviors and to be stored separately under a different trait-behavior cluster. Behaviors will only be directly linked with other behavioral information in the same trait-behavioral cluster and not with behaviors in a different trait-behavior cluster. Assuming that retrieval is guided by these clusters (cf. Hamilton, Driscoll & Worth, 1989) it was predicted that the probability that a consistent behavior will be followed by another consistent behavior (C-C) and the probability that an inconsistent

behavior will be followed by another inconsistent behavior (I-I) will be greater under two-trait conditions than under one-trait conditions. The results confirmed this prediction. Moreover, ARC-scores revealed greater clustering of consistent items and inconsistent behaviors under two-trait conditions compared to one-trait conditions.

The obtained pattern of recall and conditional recall probabilities permits a more precise formulation of the conditions under which "inconsistency resolution" takes place. Wyer and Srull (1989; see also Srull & Wyer, 1989) argued that when people engage in a process of inconsistency resolution (i.e. the attempt to reconcile apparently incompatible behaviors), priority is given to behaviors that are descriptively inconsistent with the expectancy over behaviors that are only evaluatively inconsistent with the expectancy. Our data suggest a third determinant of inconsistency resolution. Since superior recall of inconsistent items was only observed in the one-trait condition, it seems that inconsistency resolution occurs only (or at least to a higher degree) when the behaviors involved have conflicting implications for the same trait.

Apparently, interbehavior inconsistencies require inconsistency resolution, while mere stereotype-inconsistencies do not or to a lesser extent. For instance, take a group of soccer hooligans of which several aggressive behaviors have been presented (e.g., intimidating other people). Now, a particular hooligan does something rather peaceloving (e.g., tries to withhold his friends from starting a fight in the stadium). Subjects may want to resolve this inconsistency by contemplating plausible explanations (e.g., maybe normally he would have loved a fight, but now he brought his younger sister to the stadium, see e.g., Vonk, 1994). This attempt to reconcile interbehavior inconsistencies probably leads to the establishment of interbehavior links in memory resulting in a memory advantage of the inconsistent behaviors. Alternatively, given the same group of aggressive soccer hooligans, suppose subjects come across stereotype-inconsistent behaviors unrelated to aggressiveness (e.g., speaks four different languages). Although unexpected, these behaviors as such are not incompatible with aggressiveness and, therefore, they may not trigger inconsistency resolution. The resulting lack of association with consistent behaviors in memory may, despite the fact that the behaviors involved are stereotype-inconsistent, explain the observed memory-disadvantage of unrelated inconsistent information.

It may appear somewhat surprising that we obtained a memory-advantage for inconsistent behaviors over consistent information under

one-trait conditions. The usual finding in group perception is that consistent information is recalled with a higher probability than inconsistent information (see Fyock & Stangor, 1994, for a review). In research in which person perception and group perception are studied in a single experiment, results are sometimes virtually the same (Dijksterhuis & van Knippenberg, 1995b, Chapter 4; Srull, Lichtenstein & Rothbart, 1985) but, more often, strikingly different (e.g., Stern, Marrs, Millar & Cole, 1984; Wyer, Bodenhausen & Srull, 1984). However, there may be several reasons for the fact that a memory advantage for inconsistent information is obtained here. First, our stimulus set was small (18 behaviors). As Stangor & Ruble (1989) pointed out, increasing the set also increases the relative recall advantage for consistent information, presumably because (stereotypical) expectancies play a more pronounced role during encoding when cognitive load is high (see also Bodenhausen & Lichtenstein, 1987; Dijksterhuis & van Knippenberg, 1995b; Dijksterhuis, van Knippenberg, Kruglanski, Schaper, 1996; Macrae & Dijksterhuis, 1996; Macrae, Hewstone & Griffiths, 1993; Stangor & Duan, 1991). Moreover, subjects were allowed to process the information in their own pace. This also contributes to the fact that cognitive demands were extremely low in comparison to most studies using this paradigm. This low processing load is indicated by the overall recall of about 50% and may explain the fact that inconsistent information could be given enough attention to result in a high level of recall of this information.

Whether or not the reported results are generalizable to person perception remains unclear. However, some educated guesses can be made. Imagine a professor performing intelligent and aggressive behaviors at the same time. Although aggressive behaviors are unexpected, they may be thought of the same way as if these behaviors were performed by another person. An aggressive professor may conflict with stereotypical expectations, it does not necessarily conflict with the fact that this person seems to be intelligent as well.

Now imagine a particular professor performing both stupid and intelligent behaviors. Here, it seems plausible that the need to explain the occurrence of the inconsistent stupid behavior is even greater than when the different behaviors were performed by different people, simply because the contradiction may be more apparent. In a recent series of experiments, Vonk and van Knippenberg (1995) obtained empirical evidence for the differential effects of "within-person inconsistencies" and "within-group inconsistencies". In their studies, processing within-person inconsistencies

took more time than processing within-group inconsistencies, indicating that within-person inconsistencies were elaborated more thoroughly than within-group inconsistencies. This thorough elaboration of within-person inconsistencies may be due to the fact people's concept of a person is essentially more homogeneous, and allows for less contradictions, than that of a group. Therefore, one may expect our findings to be generalizable to person perception and, because within-person inconsistencies may be more apparent than within-group inconsistencies, the effect may even be more pronounced.

Notes

1. This chapter was published as Dijksterhuis & van Knippenberg (1996a).
2. Obviously, different behaviors can also be *evaluatively* consistent or inconsistent with each other. This issue is not discussed in the present study. Note, however, that when we vary descriptive inter-behavior consistency, evaluatively consistency is kept constant.
3. Of necessity, the factor 'stimulus set' is nested under the factor 'number of trait dimension'.

Chapter 4

A posteriori stereotype activation: the preservation of stereotypes through memory distortion[1]

Four experiments investigated memory for stereotype-consistent and stereotype-inconsistent information after a posteriori stereotype activation. In experiment 1, it was established that, in comparison with a no stereotype control condition, recall of stereotype-inconsistent behaviors of group members deteriorated after a posteriori stereotype activation, while recall of stereotype-consistent information was not affected. An explanation of this phenomenon in terms of the memory organization of behaviors in trait-behavior clusters was tested in experiment 2. The results of experiment 2 suggest that recall of stereotype-inconsistent behaviors suffered from a stereotype activated afterwards when they were stored in a separate trait, i.e., not linked to stereotype-consistent behaviors, while stereotype-inconsistent information that was linked to stereotype-consistent information did not. In experiment 3 the same pattern of results was obtained when an a posteriori stereotype was activated using an 'unrelated prime', i.e., the stereotype did not pertain to information presented earlier, suggesting the operation of involuntary, nonconscious processes in deteriorated recall of stereotype-inconsistent information. Finally, the results of experiment 4 provide evidence for the idea that the impaired recall of stereotype-inconsistent information may be, at least partly, ascribed to suppressed access to stereotype-inconsistent traits due to a posteriori stereotype activation.

In the literature on stereotype activation and memory, relatively little attention has been paid to the influence of an activated stereotype on recall of earlier endoded information. In their well-known 'Betty K study', Snyder and Uranowitz (1978) suggested that a stereotype presented after encoding elicits a subjective 'reconstruction' of initially encoded information. They reported superior recognition of 'heterosexual' information under conditions in which Betty K was later said to be heterosexual compared to conditions in which Betty K was said to be a lesbian. Clark and Woll (1981), however, found no such consistency advantage in similar experiments.

Rothbart, Evans and Fulero (1979) and Cohen (1981) also studied the effects of a posteriori stereotype activation. The recall data of Rothbart et al. (1979) revealed no significant difference between memory for expected and 'not-expected' behaviors. Their 'not-expected' behaviors, however, cannot

simply be regarded as inconsistent. In Cohen's (1981) study, subjects watched a videotape in which a woman performed stereotype-consistent and stereotype-inconsistent behaviors. Under conditions in which the stereotype was activated after the subjects watched the videotape, subjects were able to recognize more stereotype-consistent behaviors than stereotype-inconsistent behaviors. Later, similar findings were reported in a number of other studies in which both recognition and free recall paradigms were used (Hirt, Erickson & McDonald, 1993; Pyszczynski, LaPrelle & Greenberg, 1987; Wyer, Bodenhausen & Srull, 1984; Wyer & Martin, 1986; but see Bellezza & Bower, 1981; Clark & Woll, 1981; see, for a review, Rojahn & Pettigrew, 1992).

How does an a posteriori stereotype affect memory?

The general picture that emerges from most of the studies cited above is that, compared to prior stereotype activation, the activation of an a posteriori stereotype impedes recall of stereotype-inconsistent information, while recall of stereotype-consistent information is not affected. As it stands, however, the processes underlying a posteriori stereotype effects on recall do not seem to be well understood.

Pyszczynski et al. suggested that an a posteriori activated stereotype might function as a *retrieval cue* (for a similar argument, see Srull & Wyer, 1989; Wyer, Bodenhausen & Srull, 1984). The postulated retrieval cue mechanism may operate as follows. An a posteriori activated stereotype is supposed to elicit a memory search guided by stereotypical expectations. This would lead the search in stereotype-consistent directions, while at the same time this expectancy-guided search would misdirect or distract the search away from stereotype-inconsistent information, reducing the chance of recall of stereotype-inconsistent behaviors. Since this prediction was sustained, the retrieval cue explanation seems to be corroborated.

On closer examination, however, some questions arise that are hard to tackle within Pyszczynski et al.'s experimental design. As argued by Dijksterhuis and van Knippenberg (1995a, Chapter 2), the comparison between a priori and a posteriori stereotype activation may be more indicative of encoding than of retrieval effects. Assuming that a priori stereotype activation affects both encoding (i.e., the on-line processing and storage of information in memory) and retrieval (assuming that during the free recall task the stereotype was still activated), while stereotype activation afterwards only affects retrieval, the contrast between the two conditions would seem to be informative of differential encoding effects, and not of

differential retrieval. In other words, the better recall of stereotype-inconsistent information in the prior activation condition, compared to the stereotype-afterwards condition, most likely reflects an encoding advantage of stereotype-inconsistent information due to prior stereotype activation (see Rojahn & Pettigrew, 1992; Stangor & McMillan, 1992). Hence, to what extent a posteriori activated stereotypes serve as retrieval cues still remains somewhat in the dark.

Pure retrieval cue effects of a posteriori activated stereotypes may be revealed when one compares the effects on memory of a stereotype activated after subjects have been presented with behavioral information with a condition in which the same behavioral information is presented without mentioning the stereotype at all (i.e., a no stereotype control condition). In such a comparison there would be no encoding difference (because the two conditions are identical at this stage), and only the retrieval circumstances would vary.

Recently, Dijksterhuis and van Knippenberg (1995a, Chapter 2) reported an experiment in which, using a recognition paradigm, an a posteriori stereotype condition was compared with a no stereotype control condition. In their experiment, subjects were provided with behavioral information about two social groups. Under conditions in which the groups were labelled (as environmental activists or professional soldiers) after encoding, recognition of stereotype-consistent information was superior to recognition of stereotype-inconsistent information (as was the case in many of the cited studies). The comparison of the a posteriori stereotype activation condition with the no stereotype control condition showed a recognition decrease of stereotype-inconsistent behaviors due to afterwards stereotype activation, and no effect at all on the stereotype-consistent behaviors.

Although Dijksterhuis and van Knippenberg (1995a, Chapter 2) avoided encoding differences between conditions, the fact that they used a recognition paradigm (or, rather, a paradigm in which earlier presented behaviors had to be allocated to one of two groups), renders their study somewhat inconclusive as regards the retrieval cue function of a posteriori stereotypes. Active memory search is probably more crucial in free recall than in recognition (although retrieval processes may operate in recognition, see, e.g., Mandler, 1980). Furthermore, as argued by Bellezza and Bower (1981; see also Stangor & McMillan, 1992), recognition paradigms (or, as in this case, 'allocation' paradigms') may be subject to guessing biases. That is, if subjects have to allocate a behavior to a group (or to one of two groups), they may not really remember whether or not they have seen it as

being associated with that group, but rely on stereotype-inconsistency in their decision not to allocate.

Considering these weaknesses of this study with regard to understanding the effects of a posteriori stereotypes on retrieval, a free recall paradigm would be more appropriate. Furthermore, as we envisage to present a theoretical explanation for the deteriorated recall phenomenon, it seems worthwhile to demonstrate its robustness. Therefore, in experiment 1 we replicate Dijksterhuis and van Knippenberg's (1995a; Chapter 2) design while using a free recall task to assess memory. The results of this study show that recall of stereotype-inconsistent behavior deteriorated due to a posteriori stereotype activation, while recall of stereotype-consistent behaviors remained unaffected, which replicates earlier findings. In sum, it seems indeed that the a posteriori activated stereotype somehow deflects the memory search away from earlier encoded stereotype-inconsistent information. The question is, how?

In order to account for the observed impeded recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation, we have further elaborated on the idea that stereotypes may serve as retrieval cues. The basic tenet of the proposed 'guided search' or 'guided retrieval' explanation is that traits attributed to a group (or person) guide the memory search in the direction of trait-related behavior. An activated stereotype may lead the search in the direction of some (i.e., stereotype-consistent) traits and distract the search away from other (i.e., stereotype-inconsistent) traits. As our approach entails assumptions concerning the organization of behavioral information in memory, we will first expand on the presumed trait-behavior clustering in encoding and storage of social information, and subsequently elaborate on how this memory organization may affect retrieval.

The organization of behavioral information in memory

Traits play a major role in social perception. Upon observing the behaviors of others, we may often, when trying to make sense of these behaviors, encode them in terms of underlying traits (see e.g., Gilbert & Malone, 1995; Gilbert, Pelham & Krull, 1988). In fact, upon perceiving overt behavior we may infer the underlying trait spontaneously and unconsciously (Carlston & Skowronski, 1995; Newman & Uleman, 1989; Uleman, 1987; Winter & Uleman, 1984; Winter, Uleman & Cunniff, 1985).

If trait implications may be spontaneously invoked during encoding, it is conceivable that traits also play a role in the storage of information in memory. The person memory literature indeed suggests that traits are used to organize behavioral information in memory. When people are forming impressions, behavioral information may be clustered in memory with the help of trait dimensions (e.g., Dijksterhuis & van Knippenberg, 1996a, Chapter 3; Driscoll, 1992; Gordon & Wyer, 1987; Hamilton, Driscoll & Worth, 1989; Hastie, 1980; Srull & Wyer, 1989; Wyer, Bodenhausen & Srull, 1984). For example, behaviors such as "he kicked the cat" an "he wrecked a telephone booth" may be stored together under the trait concept "aggressive". Other behaviors, like for instance "he recited a sonnet of Shakespeare by heart" and "he explained quantum theory to his girlfriend" may be stored under another trait concept, say intelligent. Theoretically, such behavior-trait clusterings may be understood as groupings in memory of behavioral items having between-item associations as well as item-trait associations which may facilitate subsequent recall of the clustered items (e.g., Gordon & Wyer, 1987; Hamilton, Katz & Leirer, 1980a; Srull, 1983).

The role of traits and stereotypes in guided retrieval

Imagine that you observe behaviors displayed by members of a group (or by a person). Some of these behaviors imply intelligence, while others imply aggressiveness. As suggested above, these behaviors are presumably stored separately in two different trait-behavior clusters. A schematic model of the assumed underlying representation is depicted in Figure 1a.

A guided retrieval conception of recall of behavioral information would suggest that, when no stereotype is activated at all (i.e., in a no stereotype control condition), the memory search is guided by the subject's knowledge that the stimulus group (or person) is both intelligent and aggressive[2], as a consequence of which the subject may actively try to retrieve instances of intelligent and aggressive behaviors from memory. The solid lines in Figure 1a indicate the routes through which the search process would evolve. In this situation the probability of retrieval would be equal for the two types of behaviors.

However, if a stereotype is activated after the information is encoded, a different process may unroll. Suppose the subject learns that the behaviors were all performed by college professors. As a consequence, some behaviors become stereotype-consistent (the intelligent ones) and some others become stereotype-inconsistent (the aggressive ones). In this situation, a guided

search approach assumes that the activated stereotype affects the mental representation of the stimulus group (or person) in the sense that, in the present example, the association with the trait intelligent would be strengthened, while the association with the trait aggressive may be weakened. To the extent, then, that the stereotype guides retrieval, the search would preferentially be directed towards retrieving instances of intelligent behavior, while it would by the same token misdirect the search away from the stereotype-inconsistent behaviors, reducing the probability of recall of the latter. Figure 1b schematically depicts the search avenues in the case of a posteriori stereotype activation.

Figure 1. Schematic representation under two trait-conditions before (a) and after (b) stereotype activation. Solid lines indicate high probabilities of retrieving information, while dotted lines indicate low probabilities. For simplicity, inter-behavior associations are neglected.

Figure 1a.

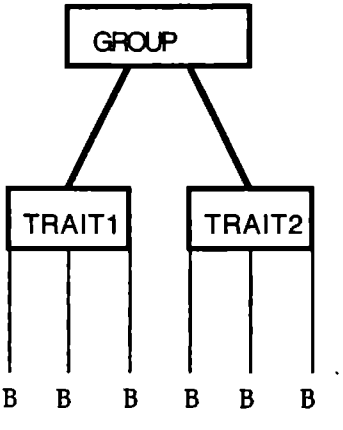
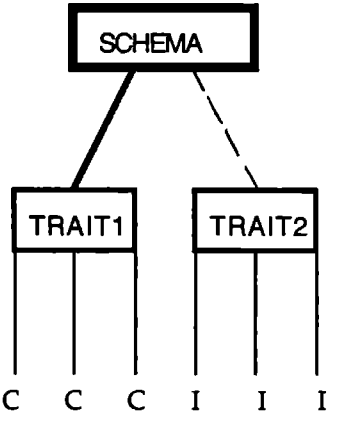


Figure 1b.



It is worth noting at this stage that the preferential search for stereotype-consistent behaviors need not lead to their enhanced recall compared to the control condition because, as we argued above, in the control condition the memory search would be trait-guided as well. Hence, the guided retrieval explanation would account for the reduced recall of stereotype-inconsistent information due to a posteriori stereotype activation, as well as for the absence of an effect on stereotype-consistent information.

This explanation in terms of trait-guided retrieval implies that recall of stereotype-inconsistent behaviors suffers from a posteriori stereotype activation only if these stereotype-inconsistent behaviors are stored under a *different* trait concept than the stereotype-consistent ones. If stereotype-consistent and stereotype-inconsistent behaviors are stored under the *same* (stereotype-consistent) trait, a posteriori stereotype activation is not expected to lead to reduced recall of stereotype-inconsistent information. Some recent research not only shows that behaviors are clustered in memory in terms of traits, but also that behaviors having opposite implications for the same trait dimension (e.g., intelligent and stupid behaviors) are stored under the same trait-behavior cluster (Dijksterhuis & van Knippenberg, 1996a, Chapter 3; Hamilton, Driscoll & Worth, 1989). In this situation stereotype-consistent and stereotype-inconsistent behaviors would become associated with the same stereotype-consistent trait (e.g., intelligence) and presumably consistent-inconsistent inter-behavior associations would be formed as well. One may therefore expect that, in this case, stereotype-consistent and stereotype-inconsistent behaviors will be recalled equally well in the no stereotype control condition (see Figure 2a) and in the a posteriori stereotype condition (see Figure 2b).

Figure 2. Schematic model of the representation in memory under one-trait condition before (a) and after (b) stereotype activation. C's represent consistent behaviors, I's represent inconsistent behaviors and B's represent behaviors of which (in)consistency is not yet defined. Again, inter-behavior associations are neglected in these figures.

Figure 2a.

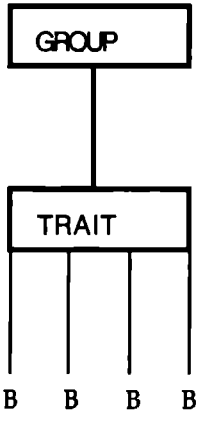
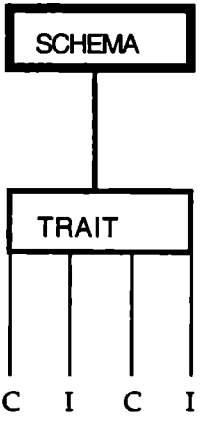


Figure 2b.



Hence, on the basis of a guided retrieval model, we predict that deteriorated recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation only occurs when stereotype-consistent and stereotype-inconsistent behaviors bear on different trait concepts (e.g., intelligent and aggressive), and not when they pertain to the same stereotype-consistent trait (e.g., intelligent). This prediction is tested in experiment 2. In agreement with our present argument, the results show that, compared to a no stereotype control condition, recall of stereotype-inconsistent behaviors suffers from a posteriori stereotype activation only when they bear on a different trait than the stereotype-consistent behaviors, while there is no deteriorated recall when they load on the same trait dimension. Furthermore, clustering data seem to corroborate the presumed underlying memory organization in terms of the same versus separate traits.

Cognitive processes operating in guided retrieval

As regards the precise nature of the guided search process, some pertinent questions remain. Is it a conscious and deliberate search strategy? A conscious search strategy would require the subjects to be aware of the fact that what they are asked to recall either pertains to an intelligent and aggressive group (that is, in the control condition), or to (e.g.) a group of professors (in the a posteriori stereotype condition) to whom they attribute the trait intelligent (and not the trait aggressive). For the strategy to be deliberate, subjects should intentionally try to retrieve trait-related behaviors. That is, their memory search might be characterized by voluntary contemplations, such as, for instance, "So this was a group of professors. Let me think, which intelligent behaviors did I see?" In such an intentional search strategy, subjects might even discard retrieved stereotype-inconsistent behaviors as inappropriate or unlikely to be true considering the nature of the stimulus group.

Conversely, the influence of the stereotype on recall may be unintentional and even nonconscious. Even without the subject's voluntary control or awareness of the nature of the search process, the activation of the professor stereotype may simply activate the trait intelligent, or enhance its accessibility, as a result of which the stored intelligence-related behaviors come to mind more easily than aggression-related behaviors. Experiment 3 was designed to see whether deteriorated recall of stereotype-inconsistent behaviors would still be observed when the a posteriori stereotype activation was brought about by an 'unrelated prime',

i.e. a task in which, prior to the recall task, subjects were asked, allegedly to help out a colleague of the experimenter, to think about (e.g.) a typical professor and to write down attributes of his or her lifestyle and appearance. The results of experiment 3 showed deteriorated recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation, again only when it was stored in a separate stereotype-inconsistent trait. Thus, even when the activated stereotype does not pertain to the stimulus group (at least, there were no signs in the debriefing that subjects saw it that way), it leads to reduced recall of stereotype-inconsistent information stored in a separate trait-behavior cluster (as indicated by the clustering data). These results suggest that the influence of an a posteriori activated stereotype on recall is unintentional and probably nonconscious.

The role of facilitated and inhibited access

There is one final issue that needs further clarification. How exactly does a stereotype 'guide' memory search? One mechanism already suggested in our argument sofar is that stereotype-consistent traits are activated, or become more accessible, by the mere activation of the stereotype. For instance, the label professor may trigger the activation of the trait concept intelligent (as it may also trigger other, less flattering, traits). As a result of the activation of the trait intelligent, subjects may unintentionally search for instances of intelligence-related behaviors. This very pre-occupation with intelligence-related behaviors may reduce the chance of retrieving examples of aggressive behaviors from memory.

However, it is conceivable that stereotype activation also suppresses access to stereotype-inconsistent traits. If one primes 'professor', it may be more difficult to think of the trait 'aggressive' and, consequently, of aggressive behaviors. Such inhibited access to stereotype-inconsistent traits may contribute to the phenomenon of deteriorated recall of stereotype-inconsistent behaviors.

There is some evidence that stereotype activation not only facilitates access to stereotype-consistent traits (cf. e.g., Devine, 1989; Dovidio, Evans & Tyler, 1986; Macrae, Stangor & Milne, 1994), but also inhibits access to stereotype-inconsistent traits (Dijksterhuis & van Knippenberg, 1996b, Chapter 5). In two different paradigms (i.e., lexical decisions and solving word puzzles), Dijksterhuis and van Knippenberg (1996b, Chapter 5) compared the recognition of trait words by stereotype-primed and nonstereotype-primed subjects. The traits to be recognized were either

stereotype-consistent, stereotype-neutral or stereotype-inconsistent. The results showed both enhanced (i.e., faster or better) recognition of stereotype-consistent traits and reduced (i.e., slower or worse) recognition of stereotype-inconsistent traits due to stereotype activation (both compared to the irrelevant-prime control condition and compared to the stereotype-neutral traits). These results were interpreted as indicative of, respectively, facilitated access to stereotype-consistent traits and inhibited access to stereotype-inconsistent traits as a result of stereotype activation. In other words, upon the activation of the professor stereotype, not only comes the trait intelligent more easily to mind, but it also seems that the stereotype impedes access to the trait aggressive. As the enhancement and suppression effects were virtually of the same magnitude, it seems plausible that both mechanisms play an important role in stereotyping (see Gernsbacher & Faust, 1991, for a related argument in the language comprehension domain).

As argued above, it is conceivable that the mere pre-occupation with the stereotype-consistent trait prevented subjects from searching for stereotype-inconsistent behaviors stored in a separate trait-behavior cluster. For instance, the activation of the professor stereotype may have incited subjects to look for intelligent behaviors, they remember some, and try again. As long as the subjects could come up with some stereotype-consistent behaviors, they may simply have persisted in persuing search within the domain of intelligence-related behaviors, thereby reducing the chance of recalling behaviors related to stereotype-inconsistent traits 'by default'. In such an interpretation of the guided search process, there is no need to assume that inhibited access to stereotype-inconsistent traits plays any role at all in the observed impeded recall.

In our view, such a persistent search in a stereotype-consistent domain is less likely to occur if there are no stereotype-consistent behaviors to retrieve at all or, more precisely, if at the initial encoding stage the group (or person) was not associated with any stereotype-consistent trait to begin with. When there are no stereotype-consistent behaviors in the stimulus material, search via stereotype-consistent traits would result in drawing blanks. One would expect subjects, then, to abandon this type of search and to try stereotype-inconsistent traits for a change, unless the a posteriori activated stereotype hampers access to stereotype-inconsistent traits.

Experiment 4 tries to elucidate the role of suppressed access to stereotype-inconsistent traits in guided retrieval by presenting stereotype-inconsistent and stereotype-neutral behaviors only. The results of

experiment 4 show impeded recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation (both compared to the no stereotype control condition and compared to recall of the stereotype-neutral behaviors) to occur even in the absence of stereotype-consistent behaviors. Therefore, it seems plausible that, next to facilitated access to stereotype-consistent traits, inhibited access to stereotype-inconsistent traits also plays a role in stereotype-guided memory search.

Experiment 1

The main goal of the first experiment is straightforward. We will try to establish the robustness of the phenomenon, that is, impaired retrieval of stereotype-inconsistent information from memory due to a posteriori activated stereotypes, by replicating the basic findings of our earlier study (Dijksterhuis & van Knippenberg, 1995a, Chapter 2) with a free recall measure. We will compare recall of stereotype-inconsistent information under conditions in which a stereotype is activated after encoding with recall of stereotype-consistent information under the same conditions and, more importantly, we will also compare recall of stereotype-inconsistent information after posterior stereotype activation with recall of the same information in a no stereotype control condition.

Wyer and Srull (1989) suggest that there is little reason to assume different processes underlying person perception and group perception, as long as the target group is a cohesive one, that is, a group that is bound by common aims and norms of behavior (see also Rojahn & Pettigrew, 1992; but see Stern, Marrs, Millar & Cole, 1984; Wyer, Bodenhausen & Srull, 1984). In the context of a test of the robustness of the effect, and because in most relevant studies stereotypes are activated before encoding, we will study a target person as well a target group for exploratory purposes.

Method

Subjects and Design

Seventy-one undergraduate students from the University of Nijmegen participated in the study, receiving Dfl. 5 (approximately 3 US Dollars) in return. Subjects were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs stereotype activation after encoding) x 2 (target: group vs individual) between-subjects design. Type of

behavior (stereotype-consistent vs stereotype-inconsistent) constituted the within-subjects factor.

Pretesting of stimulus materials

First, in a pilot study, thirty-three subjects evaluated 110 behavioral descriptions on a nine-point scale ranging from 1 (undesirable behavior) to 9 (desirable behavior). On the basis of this pilot study, 50 behavioral evaluatively neutral descriptions were selected that were more or less of the same length (25 to 35 characters). In a second pilot study, forty (other) subjects rated these descriptions on stereotypicality for members of four social groups: artists, professors, police officers and environmental activists. Subjects were asked how likely it is for a member of a group to perform a particular behavior. Nine-point scales were used with poles labeled "not at all likely" and "very likely".

Artists (or an artist) were chosen as target in the first experiment. Eighteen behavioral descriptions were selected of which six were consistent with the stereotype (M=6.98) and six were inconsistent with the stereotype (M=3.09). Furthermore, six filler items were selected (M=5.05). All items were evaluatively neutral.

Procedure

Subjects participated in the experiment in groups up to 9 persons per session. They were placed in individual cubicles containing an Apple Macintosh computer, which was used to provide all information concerning the experiment. They were asked to read a series of behavioral descriptions about members of a group (or about a single individual) at their own pace and to form an impression of this group (or individual). In the group condition, descriptions were accompanied by (male) first names. In the person condition, all descriptions were accompanied by the name "Bart". In all conditions, the first two items as well as the last two items to appear on the screen, were fillers (i.e., stereotype-neutral behaviors). All other items were presented in random order. In the stereotype afterwards condition subjects were informed, on the first screen after the presentation of the behavioral descriptions, that they had been reading about artists (or an artist). In the no stereotype activation condition, no such information was provided. After completion of the reading task, subjects were presented with a free recall task. Subsequently subjects were paid and debriefed.

Dependent variables

After reading the behavioral statements, subjects were asked to recall as many behavioral descriptions as possible. They were given 6 minutes to complete this task.

Results and Discussion

Recall

The number of each type of item recalled was counted for each subject. Filler items, however, were not included in the analyses because they were not presented in random order. An item was counted as correct if the general meaning of the original item was reflected (cf. e.g., Gordon & Wyer, 1987; Hastie & Kumar, 1979; Srull, 1981; 1983). A 2 (time of stereotype activation: no stereotype vs stereotype after encoding) x 2 (target: group vs individual) between-subjects x 2 (item type: stereotype-consistent vs stereotype-inconsistent) within-subjects ANOVA revealed a main effect for target. Subjects recalled a higher proportion of the information when the target was a person (M=.596, excluding fillers) than when it was a group (M=.519, F (1,67)= 5.19, $p < .03$). No other main effects were found.

The only significant interaction obtained was the predicted stereotype activation x item type interaction (F (1,67)= 4.21, $p < .05$, see Table 1). Stereotype activation did not influence the recall of stereotype-consistent information (F (1,67) = .22, *n.s.*). It did, however, affect the recall of stereotype-inconsistent information. As predicted, memory for stereotype-inconsistent information was worse in the stereotype after condition than in the no stereotype condition (F (1,67)= 4.63, $p < .04$). Furthermore, memory for stereotype-consistent information was better than memory for stereotype-inconsistent information in the stereotype after condition (F (1,67)=4.95, $p < .03$), while there was no difference in recall of stereotype-consistent and stereotype-inconsistent items in the no stereotype condition (F (1,67)= .46, *n.s.*).

Table 1. Recall of consistent and inconsistent information (percentages).

	person		group	
	consistent	inconsistent	consistent	inconsistent
no stereotype	59.8	64.7	52.8	53.7
stereotype	59.3	54.6	57.4	43.5

In sum, an a posteriori activated stereotype impairs retrieval of stereotype-inconsistent information from memory, both under person perception conditions and under group perception conditions. By replicating earlier findings (Dijksterhuis & van Knippenberg, 1995a, Chapter 2), with a different memory measure, the effect appears to be robust.

Experiment 2

Following from our theoretical argument outlined in the introduction, the hypothesis to be tested is that recall of stereotype-inconsistent information will be impaired upon a posteriori stereotype activation if it is stored in a separate trait-behavior cluster not fitting in with the stereotype, while no differential recall of stereotype-consistent and stereotype-inconsistent information is expected if stereotype-consistent and stereotype-inconsistent behaviors are stored in the same stereotype-related trait-behavior cluster.

It may seem confusing that a trait organization explanation is being advanced while this issue was not addressed in the construction of the stimulus material of experiment 1. Frankly, this explanation was not considered at the time we designed experiment 1. In view of our present theorizing, it may be worthwhile to take another look at the items used in this experiment. What were the stereotype-consistent behaviors for 'artists'? Some examples: "Often forgets to lock the front door", "Sometimes does'nt do the dishes for a week", and "Arranged to be rejected as unfit for the army". What were the stereotype-inconsistent items? For instance: "Had an A for math at highschool", "Often visits soccer matches", and "Goes to church every Sunday". In retrospect, it seems that some of the stereotype-consistent items (e.g., those referring to absent-mindedness, and a non-conformist attitude) do not bear on the same trait dimensions as the stereotype-inconsistent items (e.g., pertaining to math ability and sports interest) but, with some imagination, the stereotype-consistent aversion against military service and the stereotype-inconsistent religious attitude may be construed as bearing on an underlying ethics trait dimension. Hence, in terms of underlying memory organization, the stereotype-consistent behaviors and the stereotype-inconsistent behaviors may have had some dissociated as well as some common trait implications, the former being theoretically conducive of impaired recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation, while the latter presumably were not affected by it. The resulting ambiguity

concerning the role of trait organization will be explicitly addressed in experiment 2.

The hypothesis that impaired recall of stereotype-inconsistent behaviors depends on their memory dissociation from stereotype-consistent behaviors was tested in experiment 2. We provided subjects either with information loaded on the same trait dimension (e.g., intelligent and stupid behaviors) or with information loaded on different trait-dimensions (e.g., intelligent and aggressive behaviors). Again, a stereotype will be either activated afterwards or not at all.

In experiment 2, the recall task is used to measure both recall and ARC-scores (Roenker, Thompson & Brown, 1971). ARC-scores may be used to obtain evidence for differential storage for different item types in the same versus different traits conditions. It follows from our trait organization argument that we should obtain higher ARC-scores (i.e., stronger clustering) for stereotype-consistent and stereotype-inconsistent behaviors under conditions with two *separate* trait-behavior clusters than under conditions in which stereotype-consistent and stereotype-inconsistent behaviors are expected to be stored in the *same* cluster. Note that the presumed memory organization of stereotype-consistent and stereotype-inconsistent behaviors in the same or different trait-behavior clusters is assumed to take place during encoding (although the validity of this assumption is difficult to verify, see Klein & Loftus, 1990). That is, we assume that memory organization in terms of one versus two trait-behavior clusters will as such not be affected by later stereotype activation (despite the fact that it may help to explain its effects on retrieval). In a sense, these ARC scores may be regarded as checks on the trait organization manipulation.

For practical reasons, and because of the comparable results obtained in experiment 1 for person perception and group perception, only group perception is studied in this experiment.

Method

Subjects and Design

Ninety-six undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs stereotype activation after encoding) x 2 (number of trait dimensions in the stimulus material: 1- stereotype-consistent and stereotype-inconsistent information loaded on the same trait dimension vs

2- stereotype-consistent and stereotype-inconsistent information loaded on different dimensions) x 2 (target: professors vs hooligans) x 2 (stimulus set: the intelligent/ nonintelligent set vs the aggressive/ nonaggressive set in the one-trait conditions and the intelligent/ aggressive set vs the nonintelligent/ nonaggressive set in the two-traits conditions) between-subjects design. Item type (stereotype-consistent vs stereotype-inconsistent) constituted the within-subjects factor. Subjects received Dfl. 5 for participating.

Pretesting of stimulus materials

Thirty-three subjects rated fourteen social groups on fourteen trait dimensions. Nine-point scales were used with poles labeled "members of this group are not at all...(1)" and "members of this group are very...(9)". To control for possible negative-positive asymmetries (e.g., Ikegami, 1993; Reeder, 1979; Skowronski & Carlston, 1987; Vonk, 1993), two groups were selected with opposite scores. Professors were perceived as intelligent (M=7.79) and as nonaggressive (M=2.98) and hooligans were perceived as aggressive (M=8.75) and as nonintelligent (M=1.87). Subsequently, forty (other) subjects rated 98 behaviors on intelligence and aggressiveness. Nine-point scales were used with poles labeled "performing this behavior is not at all...(1)" and "performing this behavior is very...(9)" (e.g., intelligent). Thirty behaviors were selected of which 6 were intelligent, 6 were nonintelligent, 6 were aggressive, 6 were nonaggressive and 6 were neutral. Behaviors that loaded on one trait dimension were neutral with respect to the other trait dimension (see Table 2 for means).

Table 2. Stimulus material (ratings on nine-point scales)

	intelligence	aggressiveness
intelligent items	7.12	4.32
nonintelligent items	2.98	5.16
aggressive items	4.41	7.36
nonaggressive items	5.45	2.72
fillers	5.06	4.96

Four stimulus sets were constructed with 6 stereotype-consistent descriptions, 6 stereotype-inconsistent descriptions and (for all sets the

same) 6 filler items (i.e., stereotype-neutral items). In two sets, stereotype-consistent and stereotype-inconsistent behaviors had implications for the same trait dimension (either intelligent and nonintelligent behaviors, or aggressive and nonaggressive behaviors). In the two remaining sets, stereotype-consistent and stereotype-inconsistent behaviors loaded on different dimensions (intelligent and aggressive behaviors, nonintelligent and nonaggressive behaviors). The resulting design, then, is a 2 (stereotype activation) x 2 (target) x 2 (number of traits) x 2 (stimulus set) between-subjects design, with a 2 (item type) level factor as within-subjects factor.

Procedure.

The reading task and the stereotype activation manipulation were administered in the same way as in experiment 1. As in experiment 1, the first two behaviors as well as the last two behaviors to appear on the screen were fillers. All other behaviors were presented in random order. After reading the behavioral descriptions (and, in the stereotype afterwards condition, the introduction of the group label), subjects were presented with a free recall task. At the end, subjects were paid and debriefed.

Dependent variables.

The free recall task was conducted in the same way as in experiment 1. It was now also used to calculate ARC-scores.

Results and Discussion

Recall

The number of correctly recalled stereotype-consistent and stereotype-inconsistent descriptions were counted for each subject. Again, filler items were not included in the analyses because they were not presented in random order. A 2 (Stereotype activation) x 2 (Number of traits in the stimulus material) x 2 (Target: professors vs hooligans) x 2 (Stimulus set: the intelligent/ nonintelligent set vs the aggressive/ nonaggressive set in the one-trait conditions and the intelligent/ aggressive set vs the nonintelligent/ nonaggressive set in the two-traits conditions) between-subjects x 2 (item type) within-subjects ANOVA revealed a stereotype activation x number of traits x item type interaction (F (1,80)= 4.54, $p < .04$, see Table 3 for means). No other effects were obtained.

Simple two-way interactions revealed that in the no stereotype control condition and the a posteriori stereotype activation condition there was no differential recall for stereotype-consistent and stereotype-inconsistent information when they loaded on the same trait dimension (F

(1,80)= .09, *n.s.*), while there was a differential recall effect of stereotype activation under conditions with different trait dimensions (F (1,80)= 10.98, $p < .002$). Under conditions with different trait dimensions, memory for stereotype-inconsistent information was worse when a stereotype was activated after encoding compared to the no stereotype control condition (F (1,80)= 16.48, $p < .001$), while there was no effect at all of stereotype activation on stereotype-consistent behaviors ($F < 1$). In other words, reduced recall of stereotype-inconsistent information due to a posteriori stereotype activation only occurred when it was stored in a separate trait-behavior cluster. Furthermore, in the stereotype-afterwards condition, memory for stereotype-inconsistent information was worse than memory for stereotype-consistent information under conditions with separate trait-behavior clusters (F (1,80)= 17.11, $p < .001$), while there was no recall difference in the no stereotype control condition ($F < 1$).

Table 3. Recall of consistent and inconsistent information (percentages)

	1 trait		2 traits	
	consistent	inconsistent	consistent	inconsistent
no stereotype	50.0	47.9	54.8	55.6
stereotype	50.7	50.7	55.1	34.8

ARC-scores

Behaviors that are stored under the same trait-behavior cluster are likely to be reproduced in free recall consecutively (i.e., in strings of two or more) above chance expectation. The extent to which such clustering occurs is indicated by ARC-scores (Roenker et al., 1971). In conditions in which the information is stored in two separate clusters, one would therefore expect ARC-scores for stereotype-consistent and stereotype-inconsistent behaviors to be higher compared to these ARC-scores in conditions in which all behaviors are stored in one single cluster.

Two ARC-scores were computed, one representing the clustering of stereotype-consistent behaviors, the other representing the clustering of stereotype-inconsistent behaviors. These two ARC-scores were subjected to a 2 (Stereotype activation) x 2 (Number of traits in the stimulus material) x 2 (Target) x 2 (Stimulus set) between-subjects x 2 (ARC-scores) within-subjects

ANOVA. The only effect obtained was a main effect of number of traits. In agreement with the intended memory organization, it was found that clustering was higher in conditions in which stereotype-consistent and stereotype-inconsistent information had implications for different trait dimensions (ARCcon= .22 and ARCinc= .19) than in conditions in which stereotype-consistent and stereotype-inconsistent information had implications for the same trait dimension (ARCcon= .13 and ARCinc= .13; $F(1,80)= 5.22, p < .03$).

In our guided retrieval explanation, the occurrence of deteriorated recall of stereotype-inconsistent information as a result of a posteriori stereotype activation is argued to depend on its separate trait-cluster organization in memory. That is, a stereotype afterwards should bring about impaired recall of stereotype-inconsistent behaviors to the extent that these are stored in a separate trait-behavior cluster. One piece of evidence sustaining this line of argument is provided by the above reported higher ARC scores in the two-traits versus one-trait condition. In addition, one might on the basis of the same argument expect the recall of stereotype-inconsistent behaviors in the two traits/ a posteriori stereotype condition to be inversely related to the clustering of stereotype-inconsistent behaviors in a separate trait. In agreement with our argument, we indeed found a substantial and significant negative correlation between the ARC-index for inconsistent information and the recall of this information in this condition ($r= -.59, n= 24, p < .004$).

Considering the evidence provided in experiment 2, the conclusion seems warranted that deteriorated recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation is contingent upon their storage in a separate stereotype-inconsistent trait-behavior cluster. In other words, if memory storage of stereotype-inconsistent behaviors is dissociated from the storage of stereotype-consistent behaviors, the afterwards induced stereotype leads to their reduced recall. The question addressed in the next experiment is whether deteriorated recall of stereotype-inconsistent information results from an intentional and strategic search for stereotype-consistent information, or from an involuntary, perhaps even nonconscious, enhanced activation of stereotype-consistent traits and, potentially, also an involuntary de-activation of stereotype-inconsistent traits.

Experiment 3

One general approach towards explaining reduced recall of stereotype-inconsistent behaviors due to a posteriori stereotype activation is based on the assumption that subjects more or less deliberately make use of their knowledge of what the stimulus group is (said to be) like. Memory search may, for instance, take on confirmatory properties (see, e.g., Snyder & Swann, 1978, for a related argument in the domain of external information search). That is, subjects may search their memory for behaviors that fit in with traits stereotypically attributed to the group. They may think, for example, "Ah, these are hooligans. They must be aggressive. Right, I remember some aggressive behaviors." The stereotype may also incite subjects to disregard stereotype-inconsistent information, even if they do remember having seen such behaviors. "Explaining quantum theory? Hooligans? No way!"

Another, also strategic and deliberate, account would be to assume the operation of demand characteristics (Orne, 1962). Experiment 1 and 2 confront subjects with a curious string of events, which may well make them wonder what on earth the experimenter is up to. "A professor wrecking a telephone booth? I think I'm not supposed to write that down."

Obviously, there is one major flaw in this strategy-based account. It fails to explain the pivotal role of associated (same trait) versus dissociated (separate traits) storage of stereotype-inconsistent and stereotype-consistent information in memory. It is, however, conceivable that when the stereotype-consistent and the stereotype-inconsistent information bear on the same trait dimension, the inherent contradictions in the stimulus material (and possibly the attentand 'inconsistency resolution' attempts, see, e.g., Dijksterhuis & van Knippenberg, 1995a, Chapter 2; Wyer & Srull, 1989) may have obliterated the strategic handling of the situation, essentially because the cognitive effort invested in understanding these inherent contradictions may have diverted attention away from other information provided in the experiment.

Alternatively, the stereotype-guided retrieval process may be quite unintentional. The activated stereotype of hooligans may simply have installed the concept of aggressiveness in the subject's mind. Thinking of aggressiveness may have -- unintentionally and without any deliberate search strategy operating -- brought some of the just learned aggressive behaviors to mind at the expense of accessing stereotype-inconsistent traits and behaviors. In addition, recall of stereotype-inconsistent information

stored in a separate stereotype-inconsistent trait concept, may also suffer from involuntarily reduced accessibility of stereotype-inconsistent traits due to a posteriori stereotype activation (cf. Dijksterhuis & van Knippenberg, 1996b, Chapter 5).

The operation of intentional search and selection mechanisms described above would require that subjects see the activated stereotype as pertaining to the group about which they just have received behavioral information. In other words, subjects must apply the activated stereotype to the group for it to affect the recall process intentionally. If, however, as we argue, the stereotype guides memory search through unintentional and probably nonconscious processes, deteriorated recall of stereotype-inconsistent behaviors of group members would still be obtained even if the a posteriori stereotype activation is brought about by an 'unrelated prime', that is, by priming the stereotype in such a way that there is is no plausible reason to associate it with the group or the stimulus behaviors.

In order to obtain evidence for our argument that a posteriori stereotypes impede recall of separately stored stereotype-inconsistent information via involuntary processes rather than deliberate search strategies or selective responding, we replicated experiment 2 with one important modification. In experiment 3 we activate the stereotype in an ostensibly unrelated task (e.g. Dijksterhuis & van Knippenberg, 1996b, Chapter 5; Higgins, Rholes & Jones, 1977; Macrae, Stangor & Milne, 1994; Wyer & Srull, 1986). The stereotype activation procedure was the same as the procedure used in experiments conducted by Macrae, Stangor & Milne (1994; see also Dijksterhuis & van Knippenberg, 1996b, Chapter 5). Subjects were asked to think about a soccer-hooligan (or a professor) and to list lifestyle and appearance of a typical member of this group. If with the use of such an unrelated prime we replicate the results of experiment 2, a strategic explanation of the deteriorated recall phenomenon would become highly unlikely, while it would strengthen the case for an explanation in terms of unintentional processes.

Method

Subjects and Design

One-hundred and twelve undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs stereotype activation after encoding) x 2 (number of trait dimensions in the stimulus material: 1-

consistent and inconsistent information loaded one the same trait dimension vs 2- consistent and inconsistent information loaded on different dimensions) x 2 (target: professors vs hooligans) x 2 (stimulus set: the intelligent/ nonintelligent set vs the aggressive/ nonaggressive set in the one-trait conditions and the intelligent/ aggressive set vs the nonintelligent/ nonaggressive set in the two-traits conditions) between-subjects design. Item type (stereotype-consistent vs stereotype-inconsistent) serves as within-subjects factor. Subjects received Dfl. 5 for participating.

Because the stereotype activation procedure may give rise to suspicion among subjects who may be familiar with deceptions used in social psychological experimentation, we used only students from other faculties and college freshmen (the experiment was conducted in September) as subjects.

The design, the stimulus materials and the dependent variables used are the same as in experiment 2. As outlined before, the only difference concerns the stereotype activation procedure.

Stereotype activation

After subjects read the behavioral descriptions they were told that a colleague of the experimenter needed some information to be used in a forthcoming experiment. Under no stereotype activation conditions subjects were asked to list as many capital cities as they were able to come up with. Under stereotype activation conditions subjects were asked to think about a typical soccer-hooligan (or a typical professor) and to list attributes of his or her lifestyle and appearance. Both subjects under no stereotype activation conditions and subjects under stereotype activation conditions were given five minutes to complete this task. Subsequently, the recall task was introduced. Upon probing in the debriefing, none of the subjects indicated suspicion as to the real purpose of the priming task (i.e., they perceived it as an unrelated task).

Results and Discussion

Recall

The number of correctly recalled stereotype-consistent and stereotype-inconsistent descriptions were counted for each subject. Again, filler items were not included in the analyses because they were not presented in random order. These data were subjected to a 2 (Stereotype activation) x 2 (Number of traits in the stimulus material) x 2 (Target: professors vs hooligans) x 2 (Stimulus set: the intelligent/ nonintelligent set vs the

aggressive/ nonaggressive set in the one-trait conditions and the intelligent/ aggressive set vs the nonintelligent/ nonaggressive set in the two-traits conditions) between-subjects x 2 (item type) within-subjects ANOVA. First, a main effect for stereotype activation was found. Subjects recalled more information under no stereotype conditions than under stereotype activation conditions (F (1,96)= 7.13, $p < .01$). This effect is qualified by the three-way interaction described below.

The only significant interaction of theoretical interest[3] obtained was the predicted three-way interaction of stereotype activation x number of traits x item type (F (1,96)= 4.03, $p < .05$, see Table 3 for means). Simple interactions revealed that no differential recall was found when stereotype-consistent and stereotype-inconsistent information loaded on the same trait dimension (F (1,96)= .10, *n.s.*) and that recall of stereotype inconsistent information was impaired after an a posteriori activated stereotype under conditions with different trait dimensions (F (1,96)= 17.00, $p < .001$). Under conditions with different trait dimensions, memory for stereotype-inconsistent information was worse when a stereotype was activated after encoding compared to the no stereotype control condition (F (1,96)= 18.30, $p < .001$). Furthermore, memory for stereotype-inconsistent information was worse than memory for stereotype-consistent information under conditions with separate trait-behavior clusters and an a posteriori activated stereotype (F (1,96)= 21.30, $p < .001$). No other simple main effects were obtained.

Table 4. Recall of consistent and inconsistent information (percentages).

	1 trait		2 traits	
	consistent	inconsistent	consistent	inconsistent
no stereotype	49.4	46.7	54.0	47.1
stereotype	41.1	42.3	46.0	29.3

ARC-scores

Again, ARC-scores were calculated to provide evidence for the presumed memory organization in terms of 1 versus 2 traits. Two ARC-scores were computed, one representing the clustering of consistent behaviors, the other representing the clustering of inconsistent behaviors.

The ARC-scores were subjected to a 2 (Stereotype activation) x 2 (Number of traits in the stimulus material) x 2 (Target) x 2 (Stimulus set) between-subjects x 2 (ARC-scores) within-subjects design. Again, a main effect for number of traits was found, although it failed to reach significance. In case stereotype-consistent and stereotype-inconsistent information had implications for different trait dimensions, clustering was higher (ARCcon= .24 and ARCinc= .28) than under conditions where stereotype-consistent and stereotype-inconsistent information had implications for the same trait dimension (ARCcon= .17 and ARCinc= .20; F (1,96)= 3.15, $p < .08$).

We expected retrieval loss of stereotype-inconsistent information to depend on the way in which this information is stored in memory. Stereotype-inconsistent information stored in a separate trait-behavior cluster (i.e., dissociated from the stereotype-consistent information) should be hard to access. Hence, subjects who stored this information separately should show impaired retrieval of stereotype-inconsistent behaviors and, therefore, the degree of separate clustering should be correlated negatively with recall of this information. We calculated the correlation between the ARC-score for stereotype-inconsistent information and recall of this information under two-trait stereotype activation. Although the correlation failed to reach significance this time, it was indeed negative (r= -.31, n= 28, $p < .13$).

The present experiment shows that stereotype activation by means of an unrelated priming task -- i.e., a task explicitly and seemingly convincingly (as probes in the debriefing yielded no indications of suspicion) presented as unrelated to the experiment -- does lead to deteriorated recall of stereotype-inconsistent behaviors stored in a separate trait-behavior cluster, while recall of stereotype-inconsistent information stored together with stereotype-consistent behaviors in the same trait-behavior cluster does not suffer from the primed stereotype. In our view, these data constitute compelling evidence that the biased retrieval phenomenon described is of an involuntary nature, rather than the result of a controlled strategic search for stereotype-consistent information or a deliberate strategy of suppressing inconsistent responses. Except for some minor deviations, the effects of the unrelated prime in experiment 3 parallel those of the a posteriori stereotype activation in experiment 2, suggesting that the observed deteriorated recall of stereotype-inconsistent information observed in experiment 2 may be ascribed to facilitatory and/or inhibitory effects of stereotype activation. Furthermore, as in experiment 2, in the two-traits conditions we observed stronger clustering of stereotype-

consistent and stereotype-inconsistent information (as indicated by the ARC-scores) than in the one-trait conditions, underscoring the postulated role of the organization in memory of behavioral information in terms of trait clusters with regard to the deteriorated recall phenomenon.

Experiment 4

In our theoretical account of deteriorated recall of stereotype-inconsistent information, we have suggested that two co-ordinate processes may contribute to the observed phenomenon, namely facilitated access to stereotype-consistent traits and inhibited access to stereotype-inconsistent traits. Considering the evidence obtained sofar, it is, however, not necessary to posit reduced access to stereotype-inconsistent traits upon stereotype activation. It may be argued that the search in memory for behavioral information often starts with stereotype-consistent traits, due to the strong links between these traits and the stereotype (or the schema, or person concept; see e.g. Srull, 1981; Srull & Wyer, 1989). Under two-traits conditions (i.e., separate storage of stereotype-consistent and stereotype-inconsistent information), then, the enhanced probability that the search process starts in the stereotype-consistent trait-behavior cluster may simply explain the reduced recall of stereotype-inconsistent information. That is, the reduced recall of stereotype-inconsistent behaviors may be interpreted as a byproduct of the preferential retrieval of information from the stereotype-consistent cluster.

However, if, as we argue, stereotype activation also reduces access to stereotype-inconsistent traits, the deteriorated recall of stereotype-inconsistent information will be retained even if there are no stereotype-consistent behaviors at all presented in the stimulus set. That is, in situations in which a group about which information was provided is not associated with any stereotype-consistent trait to begin with, search via stereotype-consistent traits would be fruitless. The recall task would then require subjects to search for other information, including stereotype-inconsistent information, unless access to stereotype-inconsistent traits would be impeded due to the stereotype activation.

In experiment 4 we provide subjects only with stereotype-inconsistent and stereotype-neutral information. It may be argued that in such a situation a stereotype activated afterwards would not affect recall of stereotype-inconsistent information any more than it would affect

stereotype-neutral information, unless the activated stereotype suppresses access to stereotype-inconsistent traits.

The stereotype activation task used in experiment 4 is the same as in experiment 3 for two reasons. First, a replication with this procedure may demonstrate the robustness of the effect obtained in experiment 3. Second, subjects might get suspicious or confused when, after they heard what the group consisted of, they realize that they have not read one single behavior consistent with the stereotype. The unrelated stereotype prime would avoid this confusion.

Method

Subjects and Design

Thirty-six undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs stereotype activation after encoding) x 2 target: soccer-hooligans vs professors) x 2 (stimulus set: intelligent vs non-aggressive behaviors for soccer-hooligans and aggressive vs non-intelligent behaviors for professors) between-subjects design. Subjects received Dfl. 5 for participating. Only freshmen and students from outside the Psychology faculty were allowed to participate. Again debriefing indicated that the stereotype activation task was perceived as a distinct task.

Except for the stimulus material, the experiment is a replication of experiment 3.

Stimulus materials

Subjects were provided with eighteen behavioral descriptions. Six of them were inconsistent with the stereotype, the remaining 12 were fillers. Subjects in the stereotype activation condition were either provided with the stereotype of a soccer-hooligan or with the stereotype of a professor. In case the stereotype of soccer-hooligans was activated, subjects received either a set with 6 non-aggressive behaviors or with 6 intelligent behaviors. Subjects for whom the stereotype of professors was activated either received 6 aggressive behaviors or 6 non-intelligent behaviors. In the no stereotype control condition subjects were requested to list capital cities. The stimulus sets presented in these control conditions matched those used in the stereotype activation conditions. All subjects were provided with the same filler items. Six filler items were already used in experiment 2 and 3. The remaining six items were selected form the pilot-study described in the Method section of experiment 2. These items were neutral with respect to

aggressiveness (M=4.78) and with respect to intelligence (M=5.18). In this experiment, all items, including the filler items, are presented in random order.

Results and Discussion

Recall

Correctly recalled stereotype-inconsistent items and stereotype-neutral items were counted for each subject. A 2 (Stereotype activation) x 2 (Target: professors vs hooligans) x 2 (Stimulus set: the intelligent set vs the nonaggressive set in the "soccer-hooligan condition" and the aggressive set vs the nonintelligent set in the "professor condition") between-subjects x 2 (item type: stereotype-inconsistent vs stereotype-neutral) within-subjects ANOVA was performed with proportion recalled as dependent variable. Again, a main effect of stereotype activation was found. Overall recall was poorer when a stereotype was activated than when it was not activated (F (1,32)= 6.71, $p < .02$). The significant two-way interaction of stereotype activation x item type qualifies this main effect, as predicted (F (1,32)= 4.25, $p < .05$, see Table 5 for means). Recall of stereotype-inconsistent information suffered from an activated stereotype (F (1,32)= 8.62, $p < .01$), while recall of the stereotype-neutral items did not (F (1,32)= .60, *n.s.*).

Table 5. Recall of inconsistent information and filler items (percentages).

	inconsistent	fillers
no stereotype	50.5	46.1
stereotype	31.5	42.3

These results suggest that behavioral information that is inconsistent with a later activated stereotype is more difficult to retrieve from memory than stereotype-neutral behavioral information in the filler items (the latter having no shared trait implications with the stereotype-inconsistent information as shown in the reported pilot study results). As the present results demonstrate that impaired recall of stereotype-inconsistent information is obtained even in the absence of any stereotype-consistent information, it may be argued that the impeded recall of stereotype-inconsistent information observed in experiments 2 and 3 may, at least

partly, have been due to impaired access to stereotype-inconsistent traits due to stereotype activation rather than (exclusively) to preferential search for stereotype-consistent information. The present results further demonstrate that, as in experiment 3, stereotype activation by means of a priming task ostensibly unrelated to the behavioral information presented earlier does reduce access to stereotype-inconsistent behaviors, suggesting that the inhibition phenomenon studied is of an involuntary nature.

General Discussion

The present experiments show that stereotype activation leads to deteriorated recall of stereotype-inconsistent behaviors. Results establishing this phenomenon were obtained across four experiments in which three different target groups (artists, professors and soccer-hooligans) were studied. In a previous study (Dijksterhuis & van Knippenberg, 1995a, Chapter 2) comparable results were obtained for two different target groups (environmental activists and professional soldiers). Moreover, impaired memory for stereotype-inconsistent behaviors due to a posteriori stereotype activation was demonstrated in a recognition paradigm (Dijksterhuis & van Knippenberg, 1995a, Chapter 2) as well as in a free recall paradigm. So, considering these results the impaired memory phenomenon seems to be robust.

In experiment 2 a theoretical explanation in terms of trait-behavior clusters was tested. On the basis of person memory research (e.g., Dijksterhuis & van Knippenberg, 1996a, Chapter 3; Hamilton, Driscoll & Worth, 1989), it was argued that if stereotype-consistent and stereotype-inconsistent behaviors have implications for different trait dimension (e.g., aggressive and intelligent behaviors), these behaviors are stored under different trait-behavior cluster, while stereotype-consistent and stereotype-inconsistent behaviors having implications for the same trait (e.g., aggressive and non-aggressive behaviors) are stored under the same trait-behavior cluster. It was further argued that a later activated stereotype would deteriorate recall of stereotype-inconsistent information only when it was stored in a separate trait-behavior cluster which as such was inconsistent with the activated stereotype.

In agreement with this line of argument, the results of experiment 2 show that impeded recall of stereotype-inconsistent behaviors only occurred when they had implications for a different trait than the stereotype-consistent behaviors (as suggested by the results of a pilot study), and not

when they had implications for the same trait as the stereotype-consistent behaviors. The presumed underlying differential memory organization of stereotype-inconsistent and stereotype-consistent information in terms of separate traits versus the same trait was further corroborated by ARC-data (i.e., stronger clustering of stereotype-inconsistent and stereotype-consistent behavioral information, respectively, in the separate traits conditions). In addition, the obtained negative correlation between the ARC-score for stereotype-inconsistent behaviors and recall of this information under two-trait stereotype activation conditions provided further support for the idea that separate clustering in a stereotype-inconsistent trait underlies impaired recall of stereotype-inconsistent information.

Our guided search interpretation of the observed decreased recall of separately stored stereotype-inconsistent information is that the a posteriori activated stereotype involuntarily directs memory search in the direction of stereotype-consistent information and away from stereotype-inconsistent information, probably without people's awareness of the influence of the stereotype on retrieval. Alternatively, one could ascribe the observed decreased recall to an intentional retrieval or response strategy aimed at recalling and reproducing stereotype-consistent behaviors, possibly even accompanied by a strategic suppression of stereotype-inconsistent responses.

Experiment 3 was designed to investigate the idea that stereotype-biased retrieval results from involuntary and probably nonconscious cognitive processes, rather than from strategic memory search and selective response editing. After the presentation of the stimulus material, subjects were requested to help out another experimenter. They received either a filler task or were asked to think about "professors" (or "soccer-hooligans") and list features of their lifestyle and appearance. This manipulation, ostensibly unrelated to the experiment and, therefore, unlikely to elicit deliberate retrieval or response strategies, yielded the same pattern of results as the no versus afterwards stereotype activation manipulation of experiment 2. It may therefore be concluded that the obtained impaired recall of separately stored stereotype-inconsistent behavioral information was due to an involuntary process instead of being the result of an intentional search strategy. Again, as in experiment 2, the ARC-scores indicated separate clustering in the two-traits condition, underscoring our explanation in terms of the underlying trait organization.

The possibility that the mere prevalence of the involuntary search for stereotype-consistent information and subsequent reproduction of such information simply detracts from retrieving stereotype-inconsistent

behaviors organized in a separate stereotype-inconsistent trait cluster (rather than the latter being difficult to access) was investigated in experiment 4. This experiment was identical to experiment 3, except that all stereotype-consistent behaviors were replaced by additional stereotype-neutral items. It appeared that a posteriori stereotype activation resulted in decreased recall of stereotype-inconsistent behaviors (both compared to the no stereotype control condition and compared to the recall of stereotype-neutral behaviors). As there were no stereotype-consistent behaviors to retrieve, it seems unlikely that the decreased recall of stereotype-inconsistent behaviors may be ascribed to a consistency prevalence in the retrieval of behaviors. It therefore seems plausible that stereotype activation essentially makes it more difficult to access behaviors organized in a stereotype-inconsistent trait.

Our present explanation of deteriorated recall of stereotype-inconsistent information due to a posteriori stereotype activation may have some important theoretical implications. Since the investigated phenomenon appears to be robust, models describing memory for social information may need to be extended. The associative network model proposed by Srull & Wyer (1989) explains memory for behavioral information with the help of associations among behaviors, traits and stereotypes (or person concepts). They argue that the activation of a stereotype may strengthen associations between stereotype-consistent trait-behavior clusters and the "central person concept" or the stereotype. The probability of recall of items from memory is explained in terms of the *relative* strength of the associations of these items with other bits of information. Stereotype activation may enhance the strength of associations of stereotype-consistent information with the concept[4]. Such a model could account for impaired recall of stereotype-inconsistent information (organized in a stereotype-inconsistent trait) only by predicting a *relative decrease* of the strength of associations of stereotype-inconsistent information as a result of the *relative increase* of the accessibility of stereotype-consistent information, because the latter would lower the probability of retrieving stereotype-inconsistent information. However, considering the results of experiment 4, this explanation seems somewhat implausible. First, deteriorated recall of stereotype-inconsistent information was also obtained when there was no stereotype-consistent information present in the stimulus information. Secondly, recall of stereotype-inconsistent information suffered from afterwards stereotype activation, while stereotype-neutral information did not.

The above argument suggests that, in order to account for impaired retrieval of stereotype-inconsistent information, models of social memory should incorporate mechanisms accounting for suppressed (or inhibited) access to stereotype-inconsistent traits. For this purpose, one might think of extending associative network models by introducing *negative* associations (e.g. of the type "hooligans are *not* intelligent") as, for instance, proposed in the spreading activation model (see e.g. Collins & Loftus, 1975; see, for a more extensive discussion of this issue, Blair & Banaji, 1996; Dijksterhuis & van Knippenberg, 1996b, Chapter 5). Such extended or modified models might be capable of describing and predicting impaired access to stereotype-inconsistent information by postulating the active dissociation of trait and concept through a posteriori stereotype activation.

Apart from the significance of biased retrieval with respect to associative network models (Hamilton, Driscoll & Worth, 1989: Hastie, 1980; Srull & Wyer, 1989), our research may have more general implications for research on impression formation and stereotyping. Recently, the emphasis in this line of research shifted towards conditions of stereotype use (e.g. Brewer, 1988; Fiske & Neuberg, 1990) and, although this idea is not new (Allport, 1954, Lippman, 1922), towards the function of stereotypes as simplifying structures (e.g. Bargh, 1989; Devine, 1989; Dijksterhuis & van Knippenberg, 1995b, 1996b, Chapter 5; Dijksterhuis, van Knippenberg, Kruglanski & Schaper, 1996; Dovidio, Evans & Tyler, 1986; Fox, 1992; Fiske & Taylor, 1991; Gilbert & Hixon, 1991; Hamilton, Sherman & Ruvolo, 1990; Macrae, Milne & Bodenhausen, 1994; Macrae, Hewstone & Griffiths, 1993; Macrae, Stangor & Milne, 1994; Medin, 1988; Stangor & Duan, 1991). In most of this research and theorizing, the focus is basically on the influence of stereotypes on the increased accessibility and use of stereotype-consistent information. That is, the core concept in most research is consistency (or congruency, or stereotypicality). Although this research and theorizing may enhance our knowledge of the function of stereotypes and the circumstances under which stereotypes are used, it may be argued that studying the conditions under which stereotypes impede access to counterstereotypic information can add considerably to our understanding of stereotypes as well. Stereotypes may operate as knives that cut both ways, not only facilitating access to information fitting in with a stereotype, but also obstructing access to information that conflicts with it (cf. Dijksterhuis & van Knippenberg, 1996b, Chapter 5).

Considering the present theoretical ideas and empirical results, it is tempting to speculate on the significance of facilitatory and inhibitory effects

of stereotype activation for memory and, indeed, for social perception. In a sense, our guided search explanation of a posteriori stereotype effects can be understood as a more elaborate account of the nature of the memory 'reconstruction' process as Snyder called it (cf. Snyder & Uranowitz, 1978; Snyder, 1981). Stereotypes -- here conceived of as mental representations of social groups -- may serve to understand 'social reality' both by providing the perceiver with knowledge of what a group is like, and with knowledge of what a group is not like. Understanding social reality may simultaneously require the activation of appropriate knowledge and the suppression of inappropriate, or competing, knowledge (cf. Gernsbacher & Faust, 1991). Facilitation of access to stereotype-consistent information and inhibition of access to stereotype-inconsistent information may, as two sides of coin, complementarily contribute to stereotype stability and persistence.

Since many judgments we make about persons and groups are based on available information in memory (see Hastie & Park, 1986), biased retrieval may explain why memory-based judgments are biased in a stereotypical manner and, as a result, why stereotypes are hard to change (see e.g., Kunda & Oleson, 1995). Suppose we see a woman in a restaurant giving an outrageous tip and we come to the conclusion that she is far from stingy. Then, she says to the waiter that the meal, raw herring in cream, was delicious and her accent betrays that she is Dutch. Theoretically, this would make it difficult to remember her giving the tip, and, as a consequence, the Dutch may still be perceived as a bunch of misers. In sum, a stereotype may protect itself by suppressing the retrieval of counterstereotypic information.

Notes

1. This chapter was published as van Knippenberg & Dijksterhuis (1996).
2. For the sake of simplicity, guided retrieval is depicted here as a conscious process. However, as will be explained later, evidence suggests that nonconscious processes are involved.
3. Except for a three-way Number of traits (one vs two) x Group (professors vs hooligans) x Item type (stereotype-consistent vs stereotype-inconsistent information) interaction (F (1, 96)= 7.52, $p < .008$). Cell means indicate that subjects recalled stereotype-consistent information with greater ease than stereotype-inconsistent information, except under one-trait soccer-hooligans conditions. Importantly, the four way Stereotype activation x Number of traits x Group x Item type interaction was not significant (F (1,96)= .00, $p < 1$).

4. In this case, concept stands for the group or person with which the behavioral information was originally associated.

Chapter 5

The knife that cuts both ways: Facilitated and inhibited access to traits as a result of stereotype activation[1]

"Selective perception is as much a functional necessity as is veridical perception..... We have first to select what we shall see; in so doing, we become hypervigilant toward some cues and indifferent or actively defensive toward others." (G.W. Allport, 1960, p. 297).

Facilitatory and inhibitory effects of stereotype activation were studied in three experiments. It was proposed that, in semantic memory, social categories are *positively* associated with stereotype-consistent traits and *negatively* with stereotype-inconsistent traits. Based on these postulated associations, it was predicted that priming a category label would facilitate access to stereotype-consistent trait concepts and obstruct access to inconsistent trait concepts. In three experiments, primed subjects were compared to no-prime control subjects, and comparisons were made between consistent, inconsistent and irrelevant traits using different measures of accessibility. The predicted facilitatory and inhibitory effects were both obtained, suggesting that stereotype activation actively increases the retrieval probability of consistent traits and actively decreases the retrieval probability of inconsistent traits. The implications of our findings with respect to impression formation and stereotyping are discussed.

In most research on stereotype activation, stereotypes are interpreted as mental representations in which a social category (e.g., professor) is associated with traits that are (stereo)typical for this category (e.g., intelligent, industrious; see Stangor & Lange, 1994). Indeed, it has been shown that the activation of a stereotype results in the activation of semantically related trait terms or evaluatively consistent terms (Devine, 1989; Dovidio, Evans & Tyler, 1986; Gaertner & McLaughlin, 1983; Gilbert & Hixon, 1991; Lepore & Brown, 1994; Locke, MacLeod & Walker, 1994; Macrae, Bodenhausen & Milne, 1995; Macrae, Stangor & Milne, 1994; Perdue, Dovidio, Gurtman & Tyler, 1990; Perdue & Gurtman, 1990). In three studies conducted by Macrae, Stangor and Milne (1994) subjects were primed with a stereotype. Subjects were asked to think extensively about a category for five minutes and to list behaviors, lifestyle and appearance of a typical member of this social category. Later, in an ostensibly unrelated task, subjects were asked to

identify traits as fast as possible (study 1 and 2). These traits were either consistent, neutral or inconsistent with respect to the stereotype (inconsistent traits were only presented in the first study). These traits were difficult to identify because they were hidden behind a dot pattern (study 1) or in word puzzles (study 2). In the first study, where the density of the dot pattern decreased stepwise, gradually revealing the target word, primed subjects were able to identify consistent words faster than neutral or inconsistent words. Similar findings were obtained in their second study. These results suggest that, due to a process of spreading activation, priming of a stereotype facilitates access to consistent traits.

In the present article, it is argued that stereotypes are knives that cut both ways. That is, we propose that stereotype activation not only facilitates access to consistent traits --as demonstrated in several studies cited above--, but also *inhibits* access to inconsistent traits. For example, the activation of the term soccer hooligan is not only expected to enhance access to the word 'aggressive' (i.e. a stereotype-consistent trait), but also to reduce access to the word 'intelligent' (i.e. a stereotype-inconsistent trait). Theoretically, our 'double-edged knife' view on stereotypes would require that stereotypes are conceived of as networks containing not only positive associations between the social category label and consistent traits, but also negative associations between the category label and inconsistent traits. In this view, stereotype activation would entail increased access to positively associated traits as well as decreased access to negatively associated traits.

The concept of negative associations has been postulated before. For instance, in their theory of semantic processing, Collins and Loftus (1975) suggested that words share both positive and negative associations in memory. In their view, a definition of a concept is manifested by both positive relations (e.g., a bird is an animal) and negative relations (e.g., a bird is *not* a fish). With regard to our present use of the 'positively' and 'negatively' associated traits terminology, it is worth noting that these terms are rooted in the neural analogy in which the activation of a node may respectively increase or decrease the activation threshold of an adjacent node which enhances or reduces the latter's probability of 'firing' (see e.g., Eccles, 1964; see also Anderson & Spellman, 1995; Neumann & DeSchepper, 1992). In terms of associative network models (e.g., Srull & Wyer, 1989; Stangor & Lange, 1994), negative associations obviously cannot imply negative numerical values of the stereotype-trait link, simply because of

inherent mathematical constraints in such models (specifically, because probabilities are, by definition, non-negative).

Nevertheless, one may explicate positive and negative association effects in terms of associative network models as *comparative* effects of stereotype activation. That is, compared to the absence of stereotype activation (i.e. when the perceiver searches for traits without schema or stereotype guidance), the activation of a stereotype may enhance or reduce retrieval probabilities, depending on what we have called positive (i.e. stereotype-consistent traits) and negative (i.e. stereotype-inconsistent traits) associations. In concrete terms, suppose that access to traits (i.e. retrieval probability) is .50 irrespective of whether these traits are consistent, neutral or inconsistent to any unprimed stereotype we might want to study. Our present argument, then, entails that activation of a specific stereotype would enhance the retrieval probability of the positively associated (stereotype-consistent) traits to, say, .75, and reduce the retrieval probability of negatively associated (stereotype-inconsistent) traits, to, say, .25, while retrieval probability of neutral (or irrelevant) traits would be unaffected by stereotype activation.

Inhibited access

While the notion of facilitated access to consistent traits after stereotype activation is widely accepted (see, e.g., Stangor & Lange, 1994, for a review), the idea that stereotype activation may actually suppress access to inconsistent traits seems to be relatively neglected in stereotype research. Before turning to tests of the ideas outlined above, some relevant empirical evidence for inhibitory effects of stereotype activation (or activation of other concepts) is briefly discussed.

First, results obtained in studies of Perdue and colleagues (Perdue, Dovidio, Gurtman & Tyler, 1990; Perdue & Gurtman, 1990; see also Dovidio & Gaertner, 1993) point at possible semantic inhibition in the stereotype domain. Perdue and Gurtman (1990, exp. 2) asked subjects to judge trait-words on their evaluative connotation. Before each decision, subjects were subliminally primed, either with the word "young" or with the word "old". The lowest response latencies were obtained for the pairings of the prime "young" and the positive trait words, indicating that this prime facilitated access to the positive trait terms. More importantly in the present context, response latencies for the pairings of the prime "young" with the negative words were higher than the pairings of the prime "old" with both negative

and positive traits. This finding may imply active inhibition of the negative trait words that are inconsistent with the prime "young". Comparable effects were obtained by Perdue, Dovidio, Gurtman and Tyler (1990) who primed subjects with words designating ingroup (e.g., we, us) or outgroup (e.g., they, them).

Some support for the idea of inhibition of stereotype-inconsistent information is provided by recent studies conducted by Dijksterhuis & van Knippenberg (1995a, Chapter 2; van Knippenberg & Dijksterhuis, 1996, Chapter 4). In these studies, subjects were presented with a series of behavioral descriptions about members of a group. After subjects read the behavioral descriptions, a stereotype (e.g., soccer-hooligans) was activated. A comparison with a control condition in which no stereotype was activated showed that recognition (Dijksterhuis & van Knippenberg, 1995a, Chapter 2) and recall (van Knippenberg & Dijksterhuis, 1996, Chapter 4) of information inconsistent with the stereotype suffered from the activation of the stereotype. It seemed that stereotype activation inhibited access to inconsistent behavioral information in memory.

Other support for inhibitory processes comes from outside the stereotype domain. Neely (1977) for instance, found that experimenter induced expectations may actively inhibit access to words inconsistent with this expectancy. Furthermore, evidence for inhibition of evaluatively laden information may be found in the domain of attitude research, specifically, in studies investigating the automatic evaluation effect (e.g., Bargh, Chaiken, Govender & Pratto, 1992; Bargh, Chaiken, Raymond & Hymes, 1996; Chaiken & Bargh, 1993; Fazio, Sanbonmatsu, Powell and Kardes, 1986). In these studies, priming of an attitude inhibits access to a word that is evaluatively inconsistent with this attitude.

The studies cited above provide suggestive evidence for inhibition effects. The most pertinent studies (Perdue, Dovidio, Gurtman & Tyler, 1990; Perdue & Gurtman, 1990), however, do not allow us to disentangle enhanced access to consistent traits and reduced access to inconsistent traits because of the absence of control conditions in which no stereotypes are activated. Because of the lack of no-prime control conditions, the contribution of facilitation and inhibition effects to the observed differential access to consistent and inconsistent traits cannot be established. In other words, when after priming a social category, one finds that consistent trait words are more accessible than inconsistent trait words, one may only draw conclusions regarding the *relative* accessibility of consistent and

inconsistent traits. That is, higher accessibility of consistent traits in comparison to inconsistent traits may indicate facilitation effects, or inhibition effects, or both.

Three studies were conducted to test facilitatory and inhibitory effects of stereotype activation. The data were obtained in a task that was ostensibly unrelated to the priming procedure (see Higgins & Bargh, 1987; Higgins, Rholes & Jones, 1977; Macrae, Stangor & Milne; 1994; Wyer & Srull, 1986). The priming procedure was the same as in the experiments conducted by Macrae et al. (1994). Subjects were asked to think about a member of a social category and to write down anything that came to mind with respect to the behaviors, lifestyle and appearance of a typical member. As dependent variables we used response latencies (exp. 1) and identification of difficult to detect words (exp. 2 and 3).

The hypotheses were the same for all experiments. We expected priming to facilitate access to consistent trait words (indicated by lower response latencies or by better recognition of consistent words for primed subjects in comparison to no-prime control subjects) and we expected priming to inhibit access to inconsistent trait words (indicated by higher response latencies or worse recognition of inconsistent words for primed subjects in comparison to no-prime control subjects).

Experiment 1: Method

Subjects

Ninety-six undergraduate students participated in the experiment receiving Dfl. 5. (approx. US$ 3). All subjects were randomly assigned to either a prime or a no-prime control condition.

Procedure and Stimulus materials

The experiment was announced as a study of word recognition. Upon entering the laboratory, subjects were told that there was some delay in comparison to the schedule. Then, all subjects were placed in cubicles containing an Apple Macintosh computer and a button box designed to measure reaction latencies. Half of the subjects (i.e. no-prime control subjects) were told to relax for about five minutes before the experimenter would return to start the word recognition experiment. The other half of the subjects (i.e. the subjects in the prime condition) were asked whether or not they would mind helping a colleague of the experimenter to collect material for a forthcoming experiment. All subjects agreed and were then

asked to imagine a typical soccer hooligan for five minutes and to write down behaviors, life style and appearance attributes (cf. Macrae et al., 1994). This explicit instruction was given because, as in the Macrae et al., (1994) experiments, it was important that subjects would not list traits, because facilitatory effects of stereotypic traits could then be attributed to the effect that some of the traits were already retrieved during the priming stage[2]. After five minutes the computer program containing the word-recognition task was started by the experimenter.

The computer program provided all the instructions. Subjects were told that 36 words would appear on the screen in random order and that eighteen words were existing Dutch words and the other eighteen were nonsense words. On the table in front of the subjects there was a special button box with only two buttons (a "yes" and a "no" button, the -left vs. right- location of these "yes" and "no" buttons was counterbalanced). In order to obtain maximum speed during this task, subjects were asked to keep their hands near the buttons throughout the task. For every word appearing on the screen, they were asked to decide as fast as possible whether a word was a meaningful word or a nonsense word. Subjects were asked to indicate their decision by pushing the "yes" or the "no" button. All words appeared in the center of the computer screen. Four seconds after subjects pushed the button, the next word appeared on the screen.

The eighteen existing words were all trait words. These traits were gathered from a pilot-study in which forty subjects rated soccer hooligans on 56 traits. Nine-point scales were used with poles labeled "soccer hooligans are not at all...(1)" and "soccer hooligans are very...(9)". Six traits were chosen that were consistent with the stereotype of soccer hooligans (*aggressive, violent, prejudiced, insolent, insurgent, fanatic, M*=7.54, *sd*=.84), six traits were chosen that were inconsistent with the stereotype of soccer hooligans (intelligent, friendly, understanding, industrious, thoughtful, tolerant; *M*=2.71, *sd*=.75) and six traits were chosen that were irrelevant with respect to soccer hooligans (spontaneous, adventurous, nervous, introverted, happy, persuasive; *M*= 5.22, *sd*=.80)[3]. The length of the words was controlled for. That is, the mean length of the consistent traits (*M*=8.4 characters), the inconsistent words (*M*=8.4 characters) and the irrelevant traits (*M*=8.2 characters) was virtually equal.

After subjects completed the word recognition task they were thanked, paid and debriefed. The debriefing indicated that subjects were unaware of the connection between the two tasks (some subjects actually asked when the experiment on soccer hooligans was planned to start).

Results and Discussion

To reduce extreme variance and to obtain a normal distribution, all response latencies higher than 2500 ms. (mean + 3 x standard deviation) were excluded from all analyses (1.4 % of the responses). Furthermore, wrong responses (i.e., when subjects indicated that an existing word was a nonsense word; 2.1 % of the responses to existing words, and when subjects indicated that a nonsense word was an existing word; 1.3 % of the responses to nonsense words) were excluded.

As can be seen in Table 1, primed subjects reponded faster to consistent traits than no-prime control subjects, indicating facilitation. Furthermore, primed subjects reponded slower to inconsistent traits than no-prime control subjects, indicating inhibition. Mean response latencies for consistent, inconsistent and irrelevant traits were calculated and were subjected to a 2 (Prime: prime vs. no-prime) between-subjects x 3 (Trait type; consistent traits, inconsistent traits, irrelevant traits) within-subjects ANOVA. This analysis indeed revealed the predicted two-way interaction of prime by trait type ($F(2,93)= 8.09$, $p < .002$). While there were no different response latencies for different trait types under no-prime control conditions ($F(2,93)= 1.90$, *n.s.*), these differences were highly significant under prime conditions ($F(2,93)= 8.89$, $p < .001$).

Table 1. Mean response latencies on traits as a function of priming (in ms.). Means with different subscripts differ significantly ($p < .05$)

	consistent	inconsistent	irrelevant
no-prime	682_{bc}	626_{ab}	601_{ab}
prime	570_{a}	736_{c}	680_{bc}

The facilitation and inhibition effects were statistically reliable. Consistent traits were responded to faster when subjects were primed compared to response latencies for the same traits in the no-prime control conditions ($F(1,93)= 5.91$, $p < .02$). Furthermore, response latencies were higher for inconsistent traits compared to latencies for these traits under no-prime control conditions ($F(1,93)= 4.09$, $p < .05$). No differences between experimental conditions were obtained for irrelevant traits ($F(1,93)= 1.61$, *n.s.*).

These results replicate earlier findings in which stereotype activation facilitated access to evaluatively consistent words (e.g., Dovidio, Evans & Tyler, 1986; Gaertner & McLaughlin, 1983; Perdue & Gurtman, 1990) and findings in which stereotype activation facilitated access to stereotypical traits (e.g., Devine, 1989; Macrae, Stangor & Milne, 1994). Furthermore, our results show the converse effect as well. Stereotype activation not only facilitates access to consistent traits, it also actively reduces access to inconsistent traits.

In our second and third study, the notion of increased access to consistent traits and reduced access to inconsistent traits was tested in different tasks to test the robustness and the generalizability of the effects obtained in experiment 1. Therefore subjects were asked to identify words that were hidden in a complex stimulus array. Our predictions are the same as in experiment 1. If priming causes facilitated access to consistent traits and inhibited access to inconsistent traits, processing or recognizing these traits in a subsequent task should be affected accordingly (cf. Macrae et al., 1994). Therefore, it is expected that consistent traits are identified with greater ease in a complex stimulus pattern and that inconsistent traits are identified with greater difficulty in a complex stimulus pattern by primed subjects compared to no-prime control subjects.

In experiment 2, we also investigated a different stereotype. In experiment 1, we used a negative stereotype. As a consequence, all consistent traits were negative and all inconsistent traits were positive. In experiment 2, we primed subjects with a positive stereotype. This enabled us to use positive consistent traits and negative inconsistent traits as stimulus materials.

Experiment 2: Method

Subjects

Fifty-two undergraduate students participated in the experiment receiving Dfl. 5. All subjects were randomly assigned to either a prime or a no-prime control condition.

Procedure and Stimulus materials

Subjects were told that the experiment was conducted to study word recognition. Again, upon entering the laboratory, subjects were placed in one of the cubicles and asked to relax for a few minutes until the computer program could be started (no-prime control subjects) or to help with

gathering material for a forthcoming experiment (primed subjects). In the prime condition, subjects were asked to think about a typical professor and to list typical behaviors, lifestyle and appearance (cf. Macrae et al., 1994).

After five minutes, a message appeared on the computer screen stating that the experiment was about to begin. Subjects were asked to start reading the instructions. After the instructions, subjects were presented with word puzzles. Subjects were asked to identify trait words that were hidden in these word puzzles. The way the words were presented was based on a popular game on Dutch television. On the screen, three rows of characters appeared. To identify the word, subjects had to pick a character from each column. As can be seen in the example, the first and the last character were fixed. The second character had to be chosen from the second column, the third character form the third column and so on to the last column. The characters were about 8 millimeters high. An example is given below:

Figure 1. Example of a stimulus word (experiment 2).

E **O** N H K E
S F M K **T** A P **N**
P G **O** B **N** **A**

Reading the bold characters from left to right reveals "spontaan" (which is Dutch for "spontaneous"). Of course, in the actual task, the target characters were not bold printed.

All word puzzles appeared on the screen for forty seconds. If subjects identified the word, they were given fifteen seconds to write the word down on a sheet of paper. If subjects failed to recognize the word within forty seconds, they were simply given a fifteen seconds break until the next word appeared on the screen. The puzzles were presented in random order.

Eighteen trait words were hidden in the puzzles. These traits were gathered from a pilot-study in which fourty subjects rated professors on 56 traits. Nine-point scales were used with poles labeled "professors are not at all...(1)" and "professors are very...(9)". Six traits were chosen that were consistent with the stereotype of a professor (*intelligent, industrious, understanding, thoughtful, friendly, serious; M*=7.48, *sd*=.67), six traits were chosen that were inconsistent with the stereotype (*aggressive, violent, insolent, prejudiced, naive, cruel; M*=2.57, *sd*=.86) and six that were

irrelevant with respect to the stereotype (*happy, adventurous, spontaneous, nervous, fanatic, tolerant; M*= 5.06, *sd*=.81).

After subjects completed this task they were thanked, paid and debriefed. Again, subjects perceived the two tasks as distinct, unrelated tasks.

Results and Discussion

The percentages of correctly identified consistent, irrelevant and inconsistent traits were calculated for each subject. Incorrectly identified words, making up for 0.7 % of the data, were excluded.

As can be seen in Table 2, the pattern of cell means again reveals the predicted facilitatory and inhibitory effects. Primed subjects identified stereotype-consistent traits with greater ease and stereotype-inconsistent traits with greater difficulty than no-prime control subjects. The number of correctly identified traits were subjected to a 2 (Prime: prime vs. no-prime) between-subjects x 3 (Trait type: consistent, inconsistent and irrelevant) within-subjects ANOVA. The predicted interaction of prime with trait type was highly significant ($F(2,49)= 8.76$, $p < .002$). Recognition percentages for different types of traits did not differ under no-prime control conditions ($F(2,49)= 1.48$, *n.s.*). As predicted, recognition for different traits in the prime condition differed ($F(2,49)= 8.41$, $p < .002$).

Table 2. Percentages of correctly identified traits as a function of priming. Means with different subscripts differ significantly ($p < .06$)

	consistent	inconsistent	irrelevant
no-prime	71.3_b	78.2_b	73.0_b
prime	85.5_c	66.7_a	76.9_b

Simple main effects revealed that consistent traits were better identified by primed subjects compared to control subjects ($F(1,49)= 3.71$, $p < .06$), while the reverse was true for inconsistent traits ($F(1,49)= 4.00$, $p < .06$). No different percentages were obtained for irrelevant traits ($F(1,49)= .29$, n.s.). In sum, then, although simple main effects only approached statistical significance, facilitation and inhibition effects due to stereotype activation

seem to have occurred in this experiment as well, thereby replicating the results of experiment 1.

In our third experiment, we closely replicated experiment 2. The robustness of the effects was tested with word-puzzles that are more complex. In experiment 2, our critical tests of facilitation and inhibition just failed to reach the .05 level of significance. This was probably due to the fact that some subjects seemed to be much better in solving the puzzles than others, which led to high between-subjects variance. Therefore, in experiment 3, we included a covariate in the experiment to be able to control for extreme differences between subjects with regard to the ease with which the puzzles are solved.

Experiment 3: Method

Subjects

Sixty undergraduate students participated in the experiment receiving Dfl. 5. All subjects were randomly assigned to either a prime or a no-prime control condition.

Procedure and Stimulus materials

Subjects were told that the experiment was conducted to study word recognition. All subjects were placed in cubicles containing an Apple Macintosh computer. The computer program provided all the instructions. Subjects were first asked to identify fifteen well-known Dutch cities in word puzzles. This measure served as a covariate to control for between-subjects variance. Subjects were told that there would be a five minute break after the first task. As a rationale, it was said that the task was difficult and that we did not want fatigue to influence the later trials.

The way the words were presented was slightly modified compared to experiment 2 in which the first and the last character were given. On the screen, three rows of characters appeared. To identify the word, subjects first had to pick one of the characters in the left column. The second character had to be chosen from the second column, the third character from the third column and so on to the last column. An example of a hidden Dutch city is given below:

Figure 2. Example of a stimulus word (experiment 3).

P A S T H R H E M
A F V K E I M A L
N M G O B D D K E

Reading the bold characters from left to right reveals "Amsterdam". Again, in the actual task, the target characters were not bold printed.

All word puzzles appeared on the screen for forty seconds. If subjects had identified the word, they were given fifteen seconds to write the word down on a sheet of paper. If subjects failed to recognize the word within forty seconds, they were given a fifteen seconds break until the next word appeared on the screen. The words were presented in random order. After subjects were presented with fifteen cities, the priming task was introduced.

Subjects were told that they were given a five minutes break. In the no-prime condition, subjects were simply asked to relax for five minutes until the computer program would continue. In the prime condition, subjects were told that they would receive an easy task before the next session of word recognition was to be started. Subjects were asked to think about a typical soccer-hooligan and to list his behaviors, lifestyle and appearance (cf. Macrae et al., 1994). They were told that this information was to be used in a forthcoming experiment of a colleague of the experimenter.

After five minutes, subjects were again presented with word puzzles. This time, eighteen trait words were hidden in the puzzles. These traits were gathered in a pilot-study in which forty subjects rated soccer hooligans on 56 traits. Six stereotype-consistent, six stereotype-inconsistent and six irrelevant traits were selected (see Experiment 1.) These traits were presented in random order. After subjects completed this task they were thanked, paid and debriefed. Subjects' reactions in the debriefing indicated that the break we introduced was perceived as a genuine break. The word recognition task was indeed perceived as very difficult (also indicated by the overall mean recognition of less than 50 %).

Results and Discussion

The number of correctly identified words was counted for each subject. Again, incorrect identifications (2.8 %) were excluded from all

analyses. As can be seen in Table 3, where adjusted cell means are listed, facilitation effects and inhibition effects were again obtained. We subjected the data to a 2 (Prime: no-prime vs. prime) between-subjects x 3 (Trait type: consistent traits, inconsistent traits and irrelevant traits) within-subjects analysis of covariance with the percentage of identified Dutch cities as a covariate. The regression of recognition of the Dutch cities on recognition for consistent traits (F= 9.44, p < .004), on recognition of inconsistent traits (F= 45.60, p < .0001) and on recognition of irrelevant traits (F= 43.96, p < .0001), was significant. A test of the homogeneity of the covariance matrices indicated that they did not differ significantly between different types of traits, Box's M= F (10, 14821)= .96, *n.s.*).

As predicted, the prime x trait type interaction was significant (F(2,57)= 8.31, p < .002). Again, no differential recognition percentages were observed under no-prime control conditions (F(2,57)= 1.20, *n.s.*), while these differences were highly significant under prime conditions (F(2,57)= 21.63, p < .001).

Table 3. Percentages of correct identified traits as a function of priming (adjusted means). Means with different subscripts differ significantly (p < .05)

	consistent	inconsistent	irrelevant
no-prime	43.0_{abc}	49.9_{c}	47.4_{bc}
prime	62.7_{d}	35.5_{a}	37.9_{ab}

Simple main effects revealed that consistent traits were identified with greater ease by primed subjects compared to the identification of these items by no-prime control subjects (F(1,57)= 5.97, p < .02), while the reverse was true for inconsistent traits (F(1,57)= 8.42, p < .006). No statistically significant differences were obtained with respect to the irrelevant traits (F(1,57)= 2.80, p < .10). These data closely replicate our findings of experiment 2. That is, increased access to stereotype-consistent traits and decreases access to inconsistent traits due to stereotype activation was again obtained. However, the statistical evidence is considerably stronger in this experiment due to the inclusion of a covariate controlling for extreme between-subjects variance.

General discussion

The main goal of these studies was to test a stereotype model which comprises both positive and negative associations between the stereotype and trait concepts. As in current models, positive stereotype-trait associations would account for facilitated access to consistent traits. In addition, the existence of negative stereotype-trait associations was postulated to predict and explain inhibited access to inconsistent traits resulting from stereotype activation. In sum, it was predicted that priming a stereotype would enhance access to stereotype-consistent traits and reduce access to stereotype-inconsistent traits.

These expectations were supported in three experiments in which primed subjects were compared with no-prime control subjects. In all experiments, a priming procedure developed by Macrae et al., (1994) was used. In the first experiment, a lexical decision task was used. It was found that primed subjects responded faster to consistent traits and slower to inconsistent traits in comparison to responses on the same traits made by no-prime control subjects, corroborating the proposed facilitatory and inhibitory effects of stereotype activation. In experiment 2, subjects were asked to identify trait words that were hidden in word puzzles. Although the evidence was statistically weak, facilitation and inhibition effects were again obtained. In this identification task, primed subjects were able to identify consistent trait words better and inconsistent trait words worse in comparison to no-prime control subjects. In experiment 3, in which slightly modified puzzles were used, these results were replicated. In the experiments we made use of a positively evaluated stereotype (professors) as well as a negatively evaluated stereotype (soccer hooligans). Thus, in three experiments, besides demonstrating enhanced access to stereotype-consistent traits, evidence was obtained that the stereotype prime reduced the access to stereotype-inconsistent traits, suggesting some sort of inhibitory mechanism.

One might argue that a separate negative association concept, accounting for active reduction of access to inconsistent traits, is superfluous because enhanced access to consistent traits as such might suffice to explain reduced access to inconsistent traits. In associative network models (e.g., Stangor & Lange, 1994) the retrieval probability of concept 'i' (given an activated stereotype) is proposed to depend on the strength of association of the stereotype with concept i, divided by the summed associations of the stereotype with all other concepts. Thus, retrieval probability is not only

positively related to the strength of associative linkage of the concept involved but also negatively to the strengths of associative links of competing concepts. Consequently, reduced access to i could be explained solely as a result of enhanced access to other ('competing') concepts. Inhibition of access to inconsistent traits would then merely be the consequence of facilitated access to other traits.

Whether or not negative associations need to be postulated crucially depends on the comparison of priming effects of inconsistent and irrelevant traits. If priming damages the identification of inconsistent traits more than the identification of irrelevant traits, the former effect cannot be accounted for by the competitively enhanced access to consistent traits, simply because the argument would require irrelevant traits to suffer from it to the same extent. Conversely, if priming does affect access to irrelevant traits as much as it does access to inconsistent traits, the present results would fit in with the current associative network formulations.

To establish whether or not there were differential effects across experiments, we conducted a meta-analysis (cf. Mullen, 1989; Rosenthal 1978; Rosenthal & Rubin, 1979) on our three experiments. To be able to compare the results of Experiment 1 with the results of Experiment 2 and 3, recognition percentages were calculated for Experiment 1. For every subject, the median was calculated from the sample of all eighteen response latencies (six for consistent traits, six for inconsistent traits and six for the irrelevant traits). Subsequently, we counted the relative number of consistent, inconsistent and irrelevant traits recognized faster than the median. Recognition of consistent traits was compared to recognition of the same traits under no-prime control conditions. The same analyses were conducted with respect to inconsistent traits and irrelevant traits. The meta-analyses demonstrated that there was a facilitation effect for consistent traits ($Z = 3.31$, $p < .0005$, combined effect size .24), an inhibition effect for inconsistent traits ($Z = 3.73$, $p < .00009$, combined effect size .27) and, more importantly for the present purpose, no effect for irrelevant traits ($Z = .13$, $p = .45$). As these results show that priming strongly impeded access to stereotype-inconsistent traits, while access to irrelevant traits remained unaffected, it seems that inhibited access to inconsistent information cannot be interpreted solely as an epiphenomenon of competitively facilitated access to stereotype-consistent traits. Instead, the postulated concept of negative stereotype-trait associations may serve as an explanation for the observed inhibited access.

To explain the inhibitory effect of stereotype activation on stereotype-inconsistent traits, we postulated the existence of *negative* stereotype-trait associations in semantic memory, that is, the activation of a stereotype makes it difficult to access traits that contradict the stereotype. The proposed mechanism is that the category label (e.g., soccer hooligan) hampers access to traits subjectively *dissociated* from that social category (e.g, intelligence). In the neural network metaphor, we suggest that activating the category concept raises the threshold for activation of category-inconsistent (stereotype-inconsistent) concepts, as if there were direct negative links between category and category-inconsistent concepts. The assumed nature of the inhibition effect would then be the active inhibition of inconsistent subordinate concepts.

The explanation of inhibition proposed above entails a top-down mechanism, i.e., from category label to trait concept. It is, however, important to note that most recent findings on inhibitory processes are explained in terms of lateral inhibition. That is, activation of a construct inhibits a competing construct of the same level of abstractness or the same semantic category. Recently, Macrae, Bodenhausen and Milne (1996), for instance, showed that upon encountering a person (e.g., a Chinese woman), the activation of one social category (e.g, woman) inhibits the activation of the other social category (Chinese). In a similar vein, Bower (1981;1991) argues that the presence of an emotional state inhibits access to conflicting emotions. In concrete terms, when people are sad, the activation of a "sadness-node" may inhibit activation of a "happiness-node". These lateral inhibition mechanisms are fairly well documented in the past few years (see Blaxton & Neely, 1983; Gernsbacher & Faust, 1991; Neumann & DeSchepper, 1992; Tipper, 1985; Tipper & Driver, 1988; see also, Anderson & Spellman, 1995; Dagenbach & Carr, 1994 for overviews).

On the other hand, the mechanism we suggested above, i.e. top-down or "vertical" inhibition, received less attention in the literature. However, there are some other data that point in the direction of this sort of inhibition. Blair and Banaji (1996; for comparable results, see Banaji & Hardin, 1996) primed subjects with either feminine primes, masculine primes or gender neutral primes. These primes referred to appearance, objects, activities, professions or roles. After subjects were primed, a name would appear on the computer screen. Subjects were asked to indicate as fast as possible whether the name was a female name or a male name. Apart from facilitatory effect (e.g., subjects reponded faster to female names after a female prime than after a gender-neutral prime), inhibitory effects were

obtained as well. For example, subjects responded significantly slower to male names after a female prime than after a neutral prime. In concrete terms, activation of an object (e.g., flowers) seems to result in inhibited access to a social category (e.g., men).

It is possible though, to explain these results, as well as our own results in terms of lateral inhibition. Priming "flowers" may activate the social category "women", which in turn may laterally inhibit the competing category "men". Similarly, in our experiments, priming "soccer-hooligans" may activate the trait "stupidity", which in turn may have inhibited the opposite trait "intelligence". Whether our results should be explained in terms of vertical inhibition or in terms of lateral inhibition may be established in future research[4].

Inhibition, person impressions and stereotype maintenance

Facilitated access to consistent traits and inhibited access to inconsistent information due to stereotype activation may be looked upon as dual effects of stereotypes, having complementary implications for information processing. While stereotypes render some information more accessible, thereby increasing its impact on perception and interpretation, other information becomes less accessible at the same time, thereby reducing its impact on perception and interpretation. In fact, stereotypes may function as tools that automatically foster the selective perception Allport argued to be important (see the opening statement of this paper).

This conclusion may have some interesting implications for fields related to stereotyping. Stereotypes play a major role in impression formation (e.g., Brewer, 1988; Fiske & Neuberg, 1990). Bargh, Higgins and co-workers have produced a body of evidence indicating that the accessibility of a trait-construct influences the relative use of this trait on subsequent impression formation (e.g., Bargh, Lombardi & Higgins, 1988; Bargh & Pietromonaco, 1982; Bargh & Thein, 1985; Higgins, Bargh & Lombardi, 1985; Higgins, Rholes & Jones, 1977; see also Bodenhausen & Wyer, 1985; Erdley & D'Agostino, 1988; Srull & Wyer, 1979; 1980). Stereotype activation affects the accessibility of traits (see also Dovidio, Evans & Tyler, 1986; Macrae, Stangor & Milne, 1994) and, therefore, affects subsequent impression formation. Indeed, given an activated stereotype, the influence of a trait on judgment is positively related to its strength of association with the stereotype or category label (Stangor & Lange, 1994; see also Bargh, 1989; Brewer, 1988; Devine, 1989; Fiske & Neuberg, 1990: Macrae, Stangor & Milne, 1994).

Therefore, our present results suggest that, upon categorizing a target person, the probability that a stereotype-consistent trait will be used to interpret subsequent behavior will increase, and at the same time, the probability that a stereotype-inconsistent trait to be used in the impression formation process will decrease. In concrete terms, when one meets a right-wing politician (and of course, when one knows that he or she is a right-wing politician) the probability that, for instance, the trait constructs of close-mindedness, due to facilitation, will guide the impression formation process increases, and, due to inhibition, the probability that the construct of tolerance will guide impression formation will decrease. Thus stereotype activation (or categorization) instigates a dual mechanism fostering the formation of stereotype-confirming impressions and undermining the formation of stereotype-disconfirming impressions.

Expanding on the dual mechanism explicated above, there may be implications for explanations of the rigidity of stereotypes as well. Stereotypes are hard to change (see e.g., Kunda & Oleson, 1995; Rothbart & John, 1985; Weber & Crocker, 1983). One of the reasons for this rigidity of stereotypes is that people interpret information a in biased, stereotypical manner (e.g., Bodenhausen & Lichtenstein, 1987; Crocker, Hannah & Weber, 1983; Devine, 1989; Sagar & Schofield, 1980). That is, behaviors performed by a target person are interpreted in a stereotype-confirming way. Furthermore, when people make meaning of other people's behavior, interpretation in terms of traits plays a major role (Gilbert & Malone, 1995; Jones & Nisbett, 1972; Newman, 1991; Newman & Uleman, 1989; Uleman 1989; Uleman & Moskowitz, 1994). As noted above, the specific traits that will be used to interpret behavior are, at least partly, dependent on the relative accessibility of potentially available trait constructs (e.g., Bargh & Pietromonaco, 1982; Higgins, Rholes & Jones, 1977). It follows from this that facilitation of consistent traits after stereotype activation may increase the probability of stereotype-confirming interpretations of behaviors, and that inhibition of inconsistent traits after stereotype activation may decrease the probability of a stereotype-disconfirming interpretation. In concrete terms, a person helping an old man crossing the street may be perceived as friendly. However, knowing that the person is a skinhead decreases the possibility that this behavior is interpreted as friendly, since the concept of friendliness is inhibited. If this is indeed the case, the stereotypical conception of a skinhead is not violated and is not in need for reconsideration.

Especially the inhibition process may be highly beneficial. As people usually prefer to maintain their beliefs (such as stereotypes) over changing them, collecting evidence in favor of these beliefs may be helpful. However, it may even be more essential to avoid obtaining counter-evidence.

Finally, the notion of obstructed access to inconsistent traits is important from a functional perspective. Stereotypes make information processing relatively easy (Brewer, 1988; Fiske & Neuberg, 1990; Gilbert & Hixon, 1991; Macrae, Milne & Bodenhausen, 1994). As Macrae et al. (1994) pointed out, the use of a stereotype actively saves energy by preserving cognitive resources. The results reported in this article suggest that this is not only so because of the fact that helpful attributes come to mind after stereotype activation (i.e. facilitation), but also because potentially disturbing attributes are prevented from entering the stage (i.e. inhibition). In other words, stereotypes are tools (Gilbert & Hixon, 1991; Macrae, Milne & Bodenhausen, 1994) with two different functions. They automatically encourage the use of helpful and "appropriate" information and they discourage the use of disturbing and "inappropriate" information.

Notes

1. This chapter was published as Dijksterhuis and van Knippenberg (1996b).
2. As expected, throughout the three experiments, subjects hardly ever listed any traits during the priming stage. In three experiments (208 subjects), fourteen traits were listed. Only four times a trait was listed that was present in the stimulus materials.
3. Of course, in the task Dutch trait words were used. Here, we report the English translations of the original traits.
4. It is probably difficult to establish whether the inhibited access findings reported in the present article must be ascribed to top-down stereotype-trait inhibition or to lateral trait-antonym inhibition. For the time being, we see no obvious way to test, within the confines of the present experimental paradigm, which of these underlying mechanisms operate to bring about the observed inhibition of stereotype-inconsistent trait, basically because we cannot come up with traits without antonyms. To resolve this issue, then, new experimental paradigms may have to be developed.

Summary

The topic of investigation in this thesis is the impact of stereotype activation on memory. Specifically, it is examined how a later activated stereotype affects the retrieval of earlier encoded information about a person or about members of a social group. In the first part of Chapter 1, results from earlier experiments are discussed indicating that people reconstruct earlier acquired information to bring it in line with later activated stereotypes. It was tentatively concluded that stereotype activation biased memory for earlier encoded information. Previous research showed that once a stereotype was activated, people recall stereotype-consistent information better than stereotype-inconsistent information. For example, upon hearing that a person is a soccer-hooligan, it is much easier to recall previous aggressive instances of this person's behavior than it is to recall friendly behavior performed by this person. On the basis of the available information, however, it was not clear whether stereotype activation facilitated retrieval of stereotype-consistent information, or whether it obstructed memory for stereotype-inconsistent information, or both. In the second part of Chapter 1, a tentative theoretical explanation was outlined and the most important results obtained in the experiments were summarized.

In Chapter 2, the precise nature of the memory bias caused by stereotype activation was established. With this experiment, the question was addressed whether stereotype activation enhanced memory for stereotype-consistent information, or whether it reduced memory for stereotype-inconsistent information, or whether both effects would occur. Subjects were presented with behavioral information about social groups. Later, half of the subjects were told what these groups consisted of (that is, a stereotype was activated), while the remaining subjects did not receive this information. On the basis of data from a subsequent recognition task, it was concluded that stereotype activation hampered memory for stereotype-inconsistent information, while memory for stereotype-consistent information was not affected.

In Chapter 3, the organization of behavioral information in memory was studied. It was argued that behavior was encoded, stored and retrieved on the basis of their trait implications. For instance, the behavior "lends money to a friend", is encoded and stored under the trait "helpful". Trait implications, then, were expected to predict the accessibility of behavioral information in memory. In an experiment, subjects were presented with

information about a social group. Subjects either received stereotype-consistent and stereotype-inconsistent information bearing on the same trait-dimension (e.g., intelligent and unintelligent behavior) or stereotype-consistent and stereotype-inconsistent information bearing on different trait dimensions (e.g., intelligent and aggressive behavior). As predicted, data of a free recall task showed that trait implications were of crucial importance for the storage of behavioral information. Information with implications for the same trait dimension was stored together, that is, clustered together in memory in a common single trait-behavior cluster, while information pertaining to different trait dimensions was stored separately.

In the first experiment in Chapter 4, the findings of experiment 1 in Chapter 2 were replicated with a free recall task instead of a recognition task. In experiment 2, the results on the organization of information in memory on the basis of traits obtained in the experiment reported in Chapter 2 were used to explain the finding that stereotypes decreased memory for stereotype-inconsistent information. It was predicted that access to stereotype-inconsistent behavioral information bearing on the same trait dimension as stereotype-consistent information would not suffer from an activated stereotype, because this information was supposed to be stored together with stereotype-consistent information. On the other hand, memory stereotype-inconsistent behavioral information stored separately was expected to decrease as a result of stereotype activation. In other words, it was argued that impaired recall of stereotype-inconsistent information would be 'moderated' by memorial organization, i.e. that it would only occur in the case of stereotype-inconsistent information being stored in a separate trait-behavior cluster and not when it is stored together with stereotype-consistent information in a single trait-behavior cluster. Experiment 2 indeed confirmed these predictions.

In experiment 3, the assumed automaticity of inhibited access to inconsistent information after stereotype activation was investigated. Until then, this effect was described as unintentional and expected to happen without awareness. However, the observed decreased memory for stereotype-inconsistent information could have been the result of an intentional, strategic process. In experiment 3, subjects first received behavioral information. Subsequently, a stereotype was activated in an ostensibly unrelated experiment. Later, subjects were presented with a surprise free recall task. It was still observed that memory for stereotype-inconsistent information was impeded. Since a strategic explanation would require the effect only to occur when the activated stereotype directly

pertains to the behavioral information, this alternative was ruled out. Instead, the conclusion was drawn that the observed effects were unintentional. In experiment 4, another alternative was examined. It was still possible that inhibited access to stereotype-inconsistent information is merely an epiphenomenon of the fact that stereotype-consistent information is rendered more accessible by stereotype activation. In experiment 4 the inhibited access to stereotype-inconsistent information finding was replicated in an experiment in which no stereotype-consistent information was presented to the subjects. Also, while memory for stereotype-inconsistent information was impeded, memory for irrelevant (neutral) information was not affected by stereotype activation. Hence, it was concluded that obstructed recall of stereotype-inconsistent information was not simply an epiphenomenon of higher accessibility of stereotype-consistent information. On the basis of the data discussed in Chapter 4, it was concluded that stereotype-activation causes retrieval to be guided away from stereotype-inconsistent information, because access to stereotype-inconsistent traits is automatically inhibited.

Whether stereotypes indeed inhibit access to stereotype-inconsistent traits was examined in Chapter 5. In the experiments, stereotypes were activated ("primed") in a task ostensibly unrelated to the rest of the experiment. In a subsequent task, accessibility of traits was measured with a lexical decision task (experiment 1) or with a task in which traits were hidden in complex stimulus arrays (experiments 2 and 3). The results of these studies supported the assumption that stereotype activation inhibits access to stereotype-inconsistent traits. Compared to conditions under which stereotypes were not activated, stereotype-inconsistent traits were harder to access (i.e., recognized slower) than under conditions in which a stereotype was activated. These findings corroborated the idea that stereotypes actively guide the search in memory away from stereotype-inconsistent information by means of inhibition of stereotype-inconsistent traits.

The implications of the findings for research on stereotyping, impression formation and memory for social information in general are discussed in the Discussion sections of Chapter 4 and Chapter 5. Stereotypes, it was concluded, function as knives that cut both ways, not only enhancing access to stereotype-consistent information, as was established in earlier research, but also obstructing access to inconsistent information. These automatic consequences of stereotype activation, we argued, may cause people to make stereotypic impressions of others and may, in part, explain why stereotypes are so hard to change.

Samenvatting

Het onderzoek in dit proefschrift richt zich op invloed van stereotypen op het geheugen. We bestuderen de invloed van een later geactiveerd stereotype op de herinnering van eerder verwerkte informatie over personen en sociale groepen. In het eerste gedeelte van Hoofdstuk 1 worden resultaten besproken van eerder onderzoek die er op wijzen dat mensen eerder verwerkte informatie reconstrueren aan de hand van later geactiveerde stereotypen. Er werd, voorlopig, geconcludeerd dat de activatie van stereotypen het geheugen voor eerder verwerkte informatie vertekent. Eerder onderzoek toonde aan dat wanneer een stereotype werd geactiveerd, mensen stereotype-consistente informatie beter herinnerden dan stereotype-inconsistente informatie. Wanneer mensen bijvoorbeeld horen dat een bepaalde persoon een voetbalvandaal is, is het makkelijker om van deze persoon agressief gedrag te herinneren dan om vriendelijk gedrag te herinneren. Het was echter niet duidelijk, gegeven de stand van zaken op dat moment, of de activatie van stereotypen zorgde voor een betere herinnering van stereotype-consistente informatie, of zorgde voor een slechtere herinnering van stereotype-inconsistente informatie, of beide. In het tweede gedeelte van Hoofdstuk 1 presenteren we een theoretische verklaring voor vertekende herinnering na stereotype-activatie en we bespreken de belangrijkste resultaten van de experimenten.

In Hoofdstuk 2 werd de aard van de vertekende herinnering onderzocht. Met dit experiment wilden we te weten komen of activatie van een stereotype zorgt voor verbeterde herinnering van stereotype-consistente informatie, of voor verslechterde herinnering van stereotype-inconsistente informatie, of voor beide. Proefpersonen lazen informatie over twee sociale groepen. Later werd de helft van de proefpersonen verteld waaruit deze groepen bestonden (het stereotype werd geactiveerd), terwijl de andere proefpersonen deze informatie niet kregen. Op basis van de resultaten van een latere herkenningstaak werd geconcludeerd dat stereotype-activatie zorgt voor verslechterde herinnering van stereotype-inconsistente informatie terwijl herinnering van stereotype-consistente informatie niet verandert door activatie van een stereotype.

In Hoofdstuk 3 werd de organisatie van informatie in het geheugen onderzocht. Het idee werd geopperd dat informatie wordt verwerkt, opgeslagen en herinnerd in termen van karaktereigenschappen. Zo word de gedraging "leent geld aan een vriend" opgeslagen onder de noemer "behulpzaam". Wij verwachtten dat deze karaktereigenschappen de

toegankelijkheid van informatie in het geheugen bepalen. In een experiment kregen proefpersonen informatie over een sociale groep. Proefpersonen kregen of stereotype-consistente en stereotype-inconsistent informatie die betrekking had op dezelfde karaktereigenschap (bijvoorbeeld intelligent en on-intelligent gedrag) of stereotype-consistent en stereotype-inconsistente informatie die betrekking had op verschillende karaktereigenschappen (bijvoorbeeld intelligent en agressief gedrag). Met een vrije herinneringstaak werd, zoals voorspeld, aangetoond dat karaktereigenschappen een cruciale rol vervullen bij de opslag en herinnering van gedragsinformatie. Informatie met implicaties voor dezelfde karaktereigenschap wordt samen opgeslagen (dat wil zeggen, deze informatie wordt in hetzelfde cluster in het geheugen opgeslagen), terwijl informatie met implicaties voor verschillende eigenschappen apart wordt opgeslagen.

In het eerste experiment van Hoofdsuk 4 repliceerden we het experiment van Hoofdstuk 2 met een vrije herinneringstaak in plaats van een herkenningstaak. In experiment 2 hebben we onze ideeën over de organisatie van informatie in het geheugen in termen van karaktereigenschappen gebruikt om het eerder verkregen resultaat van slechtere herinnering van stereotype-inconsistente informatie na stereotype-activatie te verklaren. We voorspelden dat de herinnering van stereotype-inconsistente informatie die betrekking had op dezelfde karaktereigenchap als stereotype-consistente informatie niet zou lijden onder de activatie van een stereotype, omdat deze stereotype-inconsistente informatie opgeslagen is in hetzelfde cluster in het geheugen als de stereotype-consistente informatie. Anderzijds werd voorspeld dat de herinnering van apart opgeslagen stereotype-inconsistente informatie wel zou lijden onder de activatie van een stereotype. Met andere woorden, het optreden van verslechterde herinnering van stereotype-inconsistente informatie zou afhankelijk zijn van de wijze waarop de informatie is opgeslagen. Alleen stereotype-inconsistente informatie die apart is opgeslagen zou moeilijker te herinneren zijn na activatie van een stereotype. Experiment 2 bevestigde deze voorspellingen.

In experiment 3 werd bestudeerd of het gevonden effect - verslechterde herinnering van stereotype-inconsistente informatie na stereotype-activatie - onintentioneel en onbewust is. Tot dan toe werd aangenomen dat het inderdaad een onbewust en onintentioneel proces is. Het effect kan echter het gevolg zijn geweest van een bewust, strategisch proces. In experiment 3 lazen proefpersonen eerst gedragsinformatie. Later

werd in een ongerelateerde taak een stereotype geactiveerd. Daarna kregen proefpersonen, onaangekondigd, een vrije herinneringstaak voorgelegd. Ook in dit geval werd stereotype-inconsistente informatie slechter herinnerd. Een strategisch, bewust proces kan alleen verantwoordelijk zijn voor verslechterde herinnering als het stereotype direct betrekking heeft op de eerder aangeboden informatie en niet als er "zomaar" een stereotype wordt geactiveerd. Er werd derhalve geconcludeerd dat de geheugeneffecten onintentioneel zijn en onbewust verlopen. In experiment 4 werd een andere alternatieve verklaring getoetst. Het was mogelijk dat verslechterde herinnering van stereotype-inconsistent informatie een gevolg is van de verhoogde toegankelijkheid van stereotype-consistente informatie na stereotype-activatie. In experiment 4 werd de verslechterde herinnering van stereotype-inconsistente informatie gerepliceerd in een experiment waarin geen stereotype-consistente informatie werd gebruikt. Terwijl herinnering van stereotype-inconsistente informatie verslechterde, was er geen effect van stereotype-activatie op herinnering van neutrale (ongerelateerde) informatie. Op grond daarvan werd geconcludeerd dat de verminderde herinnering van stereotype-inconsistent informatie niet simpelweg een gevolg of bijverschijnsel kon zijn van verhoogde toegankelijkheid van consistente informatie. Op basis van de resultaten van Hoofdstuk 4 werd geconcludeerd dat de activatie van stereotypen ervoor zorgt dat het terughalen van stereotype-inconsistente informatie uit het geheugen bemoeilijkt wordt doordat het zoeken in het geheugen weggeleid wordt van stereotype-inconsistente informatie. Dit wordt veroorzaakt doordat de toegang tot stereotype-inconsistente karaktereigenschappen geinhibeerd wordt door activatie van een stereotype.

Of stereotypen inderdaad de toegang tot stereotype-inconsistente karaktereigenschappen inhiberen werd onderzocht in Hoofdstuk 5. In de experimenten werden stereotypen geactiveerd in een taak die zogenaamd ongerelateerd was aan de rest van het experiment. In een tweede taak werd de toegankelijkheid van karaktereigenschappen gemeten met een "lexical-decision" taak (experiment 1) of met een taak waarbij de karaktereigenschappen verstopt waren in woord puzzles (experimenten 2 en 3). De resultaten van de experimenten toonden aan dat de activatie van stereotypen inderdaad zorgt voor bemoeilijkte toegang tot stereotype-inconsistente karaktereigenschappen. In vergelijking met controle-condities waarin geen stereotypen werden geactiveerd, werden stereotype-inconsistente karaktereigenschappen langzamer herkend na activatie van een stereotype. Deze gegevens bevestigden het vermoeden dat het zoeken in

het geheugen wordt weggeleid van stereotype-inconsistente informatie omdat de toegang tot stereotype-inconsistente karakter-eigenschappen wordt geinhibeerd.

De gevolgen van de bevindingen voor gerelateerd onderzoek op het gebied van stereotypering alsmede voor onderzoek naar persoonswaarneming en onderzoek naar geheugen voor sociale informatie worden besproken in de Discussie-gedeelten van de Hoofdstukken 4 en 5. Een stereotype kan gezien worden als een mes dat aan twee kanten snijdt. Een stereotype verhoogt niet alleen de toegankelijkheid van consistente informatie, zoals is beschreven in eerder onderzoek, maar verlaagt ook de toegankelijkheid van inconsistente informatie. Deze automatische consequenties van stereotype-activatie kunnen verklaren waarom mensen vaak gestereotypeerde indrukken vormen van anderen en ook (deels) waarom stereotypen zo moeilijk te veranderen zijn.

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Curriculum vitae

Albert Jan Dijksterhuis werd op 12 november 1968 geboren te Zutphen. Vanaf 1980 volgde hij VWO-onderwijs aan het Baudartius College in Zutphen. Na veel vallen en opstaan werd in 1988 het VWO-diploma behaald. In 1988 startte hij met de studie psychologie aan de Katholieke Universiteit Nijmegen en in 1990 met de afstudeerrichting sociale psychologie. Na een doctoraal in de psychologie werd hij in 1993 aangesteld als AIO aan de vakgroep sociale psychologie van de Katholieke Universteit Nijmegen op het project "Stereotypen en informatieverwerking". Deze dissertatie is hiervan het resultaat.

Stellingen behorende bij het proefschrift
"Stereotypes and memory"

Ap Dijksterhuis

1. Mensen hebben een selectief geheugen voor informatie over personen en sociale groepen. Wat past binnen het stereotype herinneren we ons, wat niet past vergeten we (dit proefschrift).

2. Het begrijpen van de (sociale) werkelijkheid wordt zowel gediend met het activeren van passende kennis, als met het onderdrukken van niet passende kennis (dit proefschrift; Gernsbacher & Faust, 1991).

3. De activatie van een stereotype zet automatisch mechanismen in gang die dit stereotype beschermen. Stereotypen lijken dan ook een beetje op egels (dit proefschrift).

4a. Bewuste, beredeneerde processen bestrijken slechts een zeer beperkt deel van wat we voelen, denken en doen. De nadruk op deze processen binnen de sociale psychologie is derhalve onterecht (dit proefschrift).

4b. Af en toe zijn mensen weldenkende wezens. Zij zijn dit echter bij de gratie van gewoonte, routine en automatisme (dit proefschrift).

4c. "Ik denk niet, dus ik besta" (Jean Cocteau, zie ook Bargh, 1994).

4d. Eén van de belangrijkste, zo niet de belangrijkste taak van de experimentele psychologie is het ten grave dragen van de homunculus.

5. Iemand die beweert dat soft-drugs gevaarlijk zijn en kernproeven niet, is niet geschikt voor een functie met ook maar enige verantwoordelijkheid.

6. Theorieën die bijna alles kunnen verklaren zijn bruikbaar voor de borreltafel.

7. Over smaak valt goed te twisten.